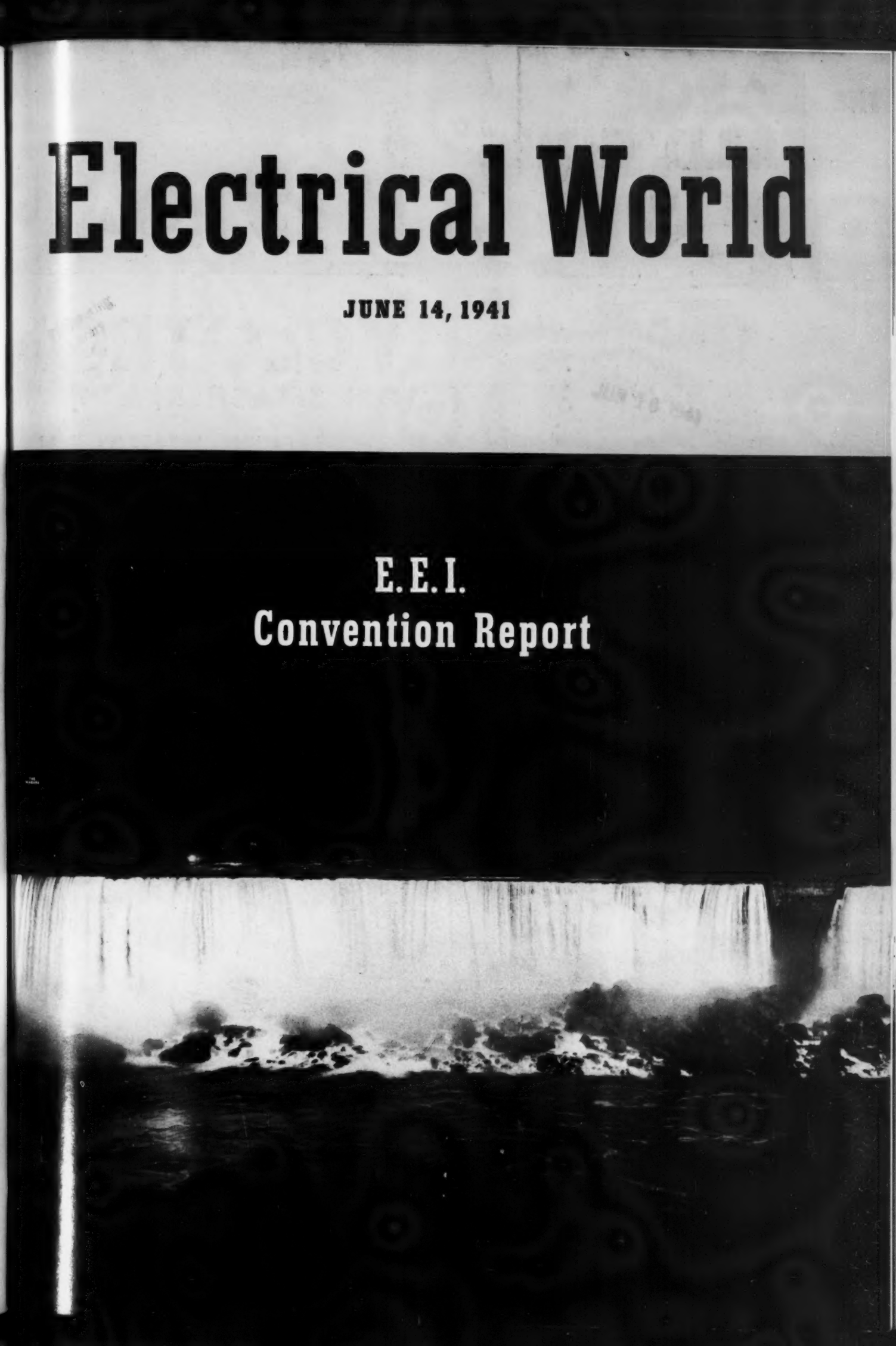
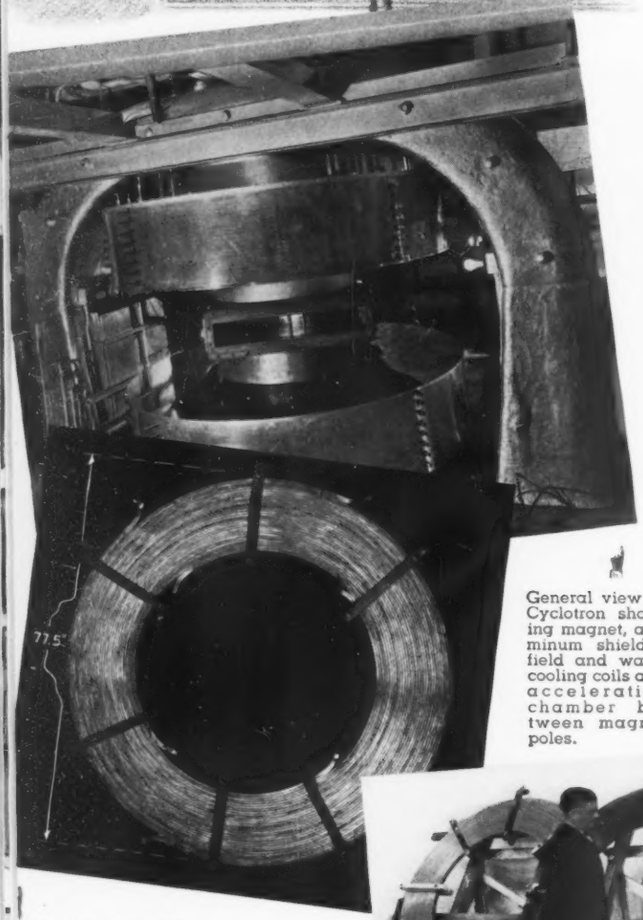
Electrical World

JUNE 14, 1941

E.E.I. Convention Report



THE LARGE FIELD COILS IN COLUMBIA'S NEW CYCLOTRON (ATOM SMASHER) WERE BUILT BY Murray



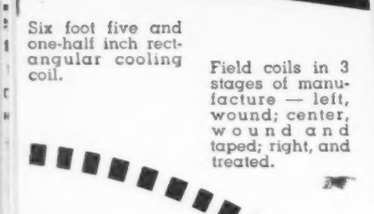
General view of Cyclotron showing magnet, aluminum shielded field and water cooling coils and accelerating chamber between magnet poles.

Of the several Cyclotrons recently installed by leading universities the newest—and one of the largest and most interesting—is Columbia's. The Murray Organization (Metropolitan Device Corporation) was chosen to provide the 16 copper field coils and the 16 water cooling coils for this instrument.

Valuable additional physical data on the structure, behavior and transmutation of atoms is expected from the use of this exceedingly large and powerful apparatus. The pictures and data on this page, for which we are indebted to Dr. Pegram, Dr. Mitchell, Dr. Dunning and Dr. Booth of Columbia's Pupin Physics Laboratory, the designers and builders of this latest Cyclotron—are published for the information of all electrical engineers. Metropolitan Device Corp., Brooklyn, N. Y.

THE TECHNICAL FACTS

For the interesting electrical data on this CYCLOTRON *just mail the coupon*



Six foot five and one-half inch rectangular cooling coil.

Field coils in 3 stages of manufacture — left, wound; center, wound and taped; right, and treated.

Winding the field coils—close-up of .1" x 1½" flat copper separated by fibroid insulation.

Made by the makers of Murray

Bridging Shells · Cable Racks · Cable Grips · Current Limiting Reactors · Disconnect Plugs · Gas Cock Seals · Malleable Strapping · Meter Boxes · Meter & Entrance Switches · Meter Seals · Meter Testing Devices · Meter Troughs · Panelboxes · Range Switches · Safety Switches · Solderless Connectors · Street Light Servicing Ladder.

METROPOLITAN DEVICE CORP'N
Brooklyn, N. Y.

Please send me data on Columbia's CYCLOTRON.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

Electrical World

FOUNDED IN 1874 • READ BY ELECTRICAL MEN FOR 67 YEARS

A. E. KNOWLTON.....Associate Editor
HENRY G. DOOLEY.....Associate Editor
G. F. WITTIG.....Statistical Editor
E. DALTON WHITE.....News Editor
CHARLES DE VORE.....Assistant Editor
E. M. GLENNON.....Assistant News Editor

BRANCH OFFICES
L. W. W. MORROW.....Western Editorial Director
D. T. BRAYMER.....Western Editor
H. S. KNOWLTON.....New England Editor
WAYNE SNOWDEN.....Pacific Coast Editor
PAUL WOOTON.....Washington Correspondent

FRANK R. INNES.....Managing Editor

S. B. WILLIAMS.....Editor
W. K. BEARD, JR.....Manager

June 14, 1941

Contents

Vol. 115, No. 24

E. E. I. CONVENTION REPORT NUMBER

Much Done—More to Do..... 60
C. W. KELLOGG, President E.E.I.

Loads and Capacities..... 62
H. S. BENNION, Managing Director E.E.I.

The Urgencies of Today..... 64

United Effort Is Necessary..... 66
D. C. PRINCE, General Electric Company

More Capacity for Distribution... 67
M. W. SMITH, Westinghouse Electric & Manufacturing Company

Whittling Trims Distribution Cost. 68
E. S. FIELDS, Cincinnati Gas & Electric Company

Direction of Distribution Development..... 69
A. E. SILVER, Ebasco Services, Inc.

Emergency Capabilities of Distribution Plant..... 71
T. G. HIERONYMUS, Kansas City Power & Light Company

Plus Values Pay Off..... 73
T. P. WALKER, Gulf States Utilities

No Relaxation of Sales Effort..... 75
R. E. FISHER, Pacific Gas & Electric

Prize Winners of the Industry..... 76

A Design for Living..... 77
H. J. MORTON, Pierce Laboratory, Inc.

Promotion Sells Service Values... 78
C. E. GREENWOOD, E.E.I.

Bases for Interconnection Agreements..... 79
J. E. MOORE, Ebasco Services, Inc.

Instrumentation Gives Gain in Hydro Output..... 81
W. B. HESS and J. M. MOUSSON, Safe Harbor Water Power Corporation

Carter Field on Washington Events..... 86

News of the Week..... 87

Editorials.....59 and 84
Field Operating Practices..... 96
Industrial Engineering..... 104
New Engineering Ideas..... 108
Load Building..... 110
New Equipment..... 114
News About People..... 159
Manufacturing and Markets..... 162
Sales Opportunities..... 166
Rural Allotments..... 168
Recent Rate Changes..... 169
Municipal Plants..... 170

Index of Advertisements..... 182

The contents of this issue are copyrighted and may not be reproduced without the permission of the copyright owner.

McGRAW-HILL PUBLISHING COMPANY, INC.

JAMES H. McGRAW, Founder and Honorary Chairman

Electrical World—Published weekly. Price 25 cents a copy. Allow at least ten days for change of address. All communications about subscriptions should be addressed to the Director of Circulation, 330 West 42d Street, New York, N. Y. Subscription rates: In the United States, Mexico, Central and South American countries, $5 a year, $8 for two years, $10 for three years; Canada, $5.50 for one year, $9 for two years, $11 for three years (Canadian money at par). Great Britain and British possessions, 54 shillings for one year, 108 shillings for three years. All other countries $9 for one year, $18 for three years. Entered as second-class matter November 16, 1936, at Post Office at Albany, N. Y., under the Act of March 3, 1879. Printed in U. S. A. Contents copyrighted, 1941, by McGraw-Hill Publishing Company, Inc. Branch Offices: 520 North Michigan Avenue, Chicago; 68 Post Street, San Francisco; Aldwych House, Aldwych, London, W. C. 2; Washington, Philadelphia, Cleveland, Detroit, St. Louis, Boston, Atlanta, Ga.

Publication Office
99-129 North Broadway, Albany, N. Y.

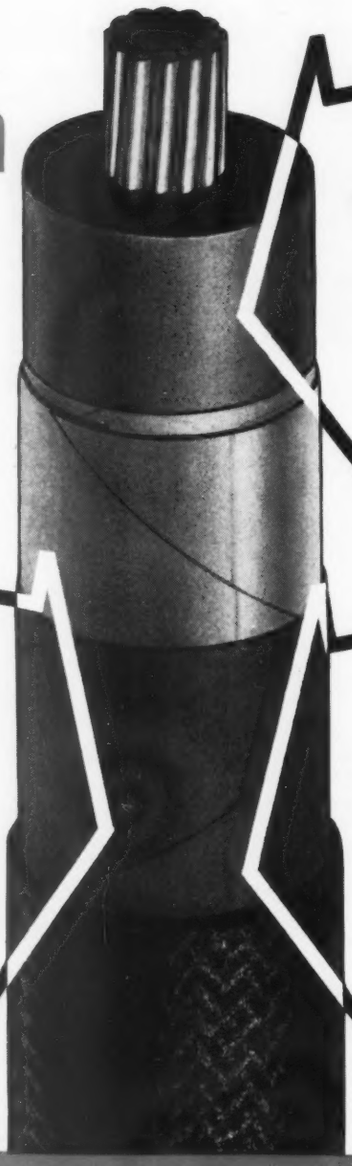
Editorial and Executive Offices
330 West 42d Street, New York, N. Y.

JAMES H. McGRAW, Jr.....President
HOWARD EHRLICH.....Executive Vice-President
MASON BRITTON.....Vice-Chairman
B. R. PUTNAM.....Treasurer
D. C. McGRAW.....Secretary
J. E. BLACKBURN, Jr.....Director of Circulation

Member A.B.P. Member A.B.C.
Cable Address McGRAWHILL, New York

A McGRAW-HILL PUBLICATION

Look at it from ANY ANGLE



RELIABLE PERFORMANCE

The continued choice of Hazard Keystone Cable by so many companies . . . for more than 40 years . . . testifies to the complete assurance you have of obtaining reliable, efficient high tension service.

LONG LIFE

Stubbornly resistant to corona... moisture . . . and heat, Hazard Keystone Insulated Cable also possesses excellent aging qualities. You can count on it to deliver the long cable life that means distribution economy.

LOW COST

Hazard Keystone Cable is priced to deliver an extremely high quality of service at low cost. It will pay you to let us study your requirements.

HAZARD KEYSTONE CABLES

for HIGH TENSION SERVICE

You'll find Hazard Keystone Cables particularly efficient and economical for:

High-voltage Circuits of almost every type
Station Control Wiring
Apparatus and Equipment Leads
Submarine Cables
Station Cables
Underground Service
Aerial Cables
Vertical Riser and Shaft Cables
Test Leads and other special applications

Send for complete information

HAZARD INSULATED WIRE WORKS
Works: Wilkes-Barre, Pa.

Division of The Okonite Company
Offices in principal cities

ELECTRICAL WORLD • JUNE 14, 1941

The Beginning

A pendulum has to swing through the lowest point of the arc before it can start on its upward course. In some respects the convention last week at Buffalo of the Edison Electric Institute marked the same position in the course of the utility industry.

The attendance, a large part of which was people not employed in the utility business, was smaller than it has been in many years. But this would not have mattered had there been enthusiasm or confidence among those present, or had there been something in the program to inspire the people. The papers individually were good, but the program lacked the broad perspective, the vision so badly needed by an industry that is running around in circles like a rudderless Bismarck.

And to cap it off, the convention closed with the appearance of the chairman of the SEC, who came for the purpose of telling the industry that there would be no reprieve for the holding companies, but that the execution would go forward on schedule.

While utility people have seen the demise of the large holding company systems coming, this was the first time they had with their own ears heard the doctor say without equivocation that there was no hope.

And that was the biggest thing in the convention. It should be the turning point in the progress of the electric utility industry. It should mark the beginning of another upward swing.

For years a great part of the operating companies have looked to their parent companies for direction and leadership. Generally these great systems have supplied cohesion and program and policy. Now, while they are still available for advice, the operating man should begin to show his independence against the time when he will be completely on his own.

In his local area this, for the most part, will not be difficult. Nationally, on the other hand, the local man will have problems that will require more reliance upon association and the selection of national leaders. Unless there is strong organization to take the place of the several holding companies, this process of disintegration will be fatal.

The public ownership power people have no intention of leaving the operating properties alone, once the parent companies are disintegrated. Before the blitzkrieg starts against individual companies, the public must be told positively how it benefits from the operation of privately owned electric utilities.

The important thing is that now more than ever before the utility industry needs strong organization, fearless and capable leaders and a program for presenting its case before the highest court in the land, the court of public opinion.

No, the time is not too late—it is just beginning. Eicher's talk was the signal to the operating men to get going—and the indications are that they have started.

Much Done, More To Do

E. E. I. president's address emphasizes necessity for utilities to keep ahead of defense load demands and simultaneously to continue sales efforts so as to assure home-front morale

C. W. KELLOGG, President Edison Electric Institute

LARGE TOTALS of new power (utility, government and industrial) in 1941 (4,150,000 kw.) and 1942 (3,430,000 kw.), each exceeding by 50 percent any past annual growth in demand and each being more than five times as great as the annual demand growth during the first World War, are gratifying, but should lead us to no feeling of smug satisfaction, on account of the way the defense program continues to expand with the unfolding of the war drama.

Developments in recent months have shown that merely budgeting costs and placing orders for generating equipment are not by themselves sufficient to bring new capacity into being. While the placing of orders for equipment and materials long enough in advance is as necessary as it ever was, there still remains the matter of actually getting the goods and getting them on time.

Abstract of paper to Edison Electric Institute convention, 1941.

C. W. Kellogg

This has led to constantly mounting problems of priorities.

On account of the importance of the subject I have advised all of our companies whose priority claims have passed through my hands that they must demonstrate their need for preference rating by the most rigid proof, giving defense power requirements by detail schedule, with names, amounts of power and purpose for which used, and tying this in with the growth of system peak loads and the size of the unit for which the preference rating is asked.

The power shortages estimated by public bodies have generally been at a time in the future so far away that they have been eliminated by new construction before the time arrived for their expected occurrence.

Reserves Are Extensive

In addition to the unprecedented increases of 7,500,000 kw. in generating capacity to be added in 1941 and 1942, a great basic element of strength in the electric power situation is the ample reserves of generating capacity that have been built up over past years. The excess of 30 percent over the annual peak loads, represented by the installed capacity of generating equipment in this country, is required partly for operation, but there is still left over a generating margin averaging perhaps 10 to 15 percent to be drawn upon as needed. Another unused reserve is the ability in emergency to exceed rated capacities by a margin of 10 to 15 percent or more during a peak of moderate duration. A still further resource, that has so far hardly been tapped in the present emergency, is the huge increase in energy that would be available from continuous operation throughout the 24 hours of the day for seven days a week. This could add 15 to 20 percent to the annual power output of all electric generators, sufficient to carry a further increase in industrial production of nearly 20 percent.

Until all of the considerations above recited have been applied to a given situation, any allegation of power shortage is unwarranted.

During the past year the SEC has been active with proceedings under Section 11 of the act against the holding companies. This "integration" or "disintegration" is being applied not only on the basis of the act (whereby disintegration has nothing whatever to do with the degree to which any company is or is not guilty of any of the abuses against which the act is directed) but in addition judged by certain tentative conclusions is being made more complete by the apparent reading into the act of words which it does not contain.

Confidence Needed

The history of the development of the utility industry clearly shows that the holding companies have been of enormous benefit to the people, in the extension of electric service to millions of homes that otherwise would not have it, in the lowering of rates and improvement of service and in the financing of the huge developments that made all these benefits possible. One would suppose that after such abuses as might have arisen in this great development process had by law been eliminated from the holding companies, they would be allowed to continue to perform their useful functions in the public service.

With the huge scope and essentially industrial nature of our defense effort, the restoration of confidence in the soundness of its business enterprise would seem to be of

B. C. Fairchild, Canadian Electric Association; Alan Brown, Gatineau Power; R. H. Mather, Shawinigan Water & Power; G. A. Gaherty, president of Canadian Electrical Association, Montreal Engineering Company; J. E. Lawson, Canadian Niagara Power

intimate concern to our people and their government.

It is worth recording that the latest available combined utility balance sheet of the country shows a ratio of 51.8 to 48.2 between bonds and stocks—a relationship the same as twelve years before. The maintenance of this conservative debt ratio, difficult though it may be, is a source of underlying strength to the utilities, which should bring renewed public confidence in their securities when normal financial conditions return.

Nothing has been brought out more clearly, from the experience of both the present conflict and the World War of a generation ago, than the paramount importance of the home front, not for sentimental reasons only but as a very practical measure of defense. Labor saving in the home means that much more energy for defense production. The expanding payrolls of the defense activity have produced so far this year increases of 51 percent in refrigerator sales and 42 percent in range sales over the previous year. These represent a broad need which it is our duty to develop in the public interest.

Keep On Selling

Sales activity in the commercial and residential fields not only helps with public morale but helps to keep rates down. The fact that average energy rates in the home continue to drop, in the face of rises on all sides in the cost of other commodities, should be a great satisfaction to the Office of Prices and Consumer Service.

Finally, keeping the utilities as solvent as possible is a strong defense desideratum, because impoverished utilities would mean inefficient service. This fundamental need of our business is as important for the emergency as during the trying postwar depression that is bound to follow the present stupendous public expenditure.

The Edison Electric Institute has been successful during the past year in fulfilling its function as a forum for the exchange of information, as a statistical and fact-finding body, in participating in various co-operative national sales programs, and in representing the industry in national proceedings such as those of standardizing committees and code-making bodies. The attendance at committee meetings, the unprecedented size of the three annual conferences on sales, accounting and engineering, and the demand for their reports and proceedings, attest to the real value of such organization. In view of all the changes and developments of the present times, vitally affecting the future of our industry, it is obviously important that our engineering, sales, accounting, rate-making and other operations be kept under close study, to take full and immediate advantage of every possible improvement which will safeguard the immediate and future well-being of our companies.

Last winter the Institute was requested by the SEC to file an annual report of earnings and expenses and to advise the commission as to the nature of its activities. The request for this report was based on the claim that the Institute was, under the definitions in the Holding Company Act, engaged principally in the business of furnishing service to utility companies and was therefore a service company. Our counsel confirmed this finding and the report was filed with the commission in March. Some members of the Institute not subject to regulation by the SEC became apprehensive that, as a result of this ruling and filing, they would, solely through their membership in the Institute, become subject to SEC regulation, and a few members, including our largest one, resigned from the Institute.

I took the matter up with the commission, explaining that if the resignation movement continued it bid fair so to weaken the Institute as greatly to curtail its usefulness to the industry and to the public, if indeed it could continue to function at all. In view of the long and effective record of the Institute and its predecessor in the maintenance and improvement of the electric service rendered to the people, I could only view its dissolution as a distinct public loss.

With this viewpoint the commission agreed, and while it is contrary to its policy to issue advisory opinions, it did arrange for a letter from the head of its Public Utility Division, copies of which were sent to the members of the Institute. In substance the letter agreed with the opinion of our counsel, that membership in the Institute would not affect the status of any member as to the regulation by the SEC, but that if any attempt were made to assert such regulatory power on the basis of such membership the situation could after such determination be completely cleared by resignation.

R. A. Sharon, Arkansas Power & Light, and Hamilton Moses, Ebasco Services, Inc.

Loads and Capacities

Appraisal of load growth, the factors determining it and the capacities available, including elements of reserve which are real and great although impossible of statistical statement

H. S. BENNION, Edison Electric Institute

AMERICA, slow to begin rearming measures when war-minded nations were arming themselves, a year ago began to make appropriations of unprecedented magnitude for rearmament and for the provision of camp and training facilities for military and naval forces. This huge government spending, without the depressing influences of participation in actual war, and coupled with purchases by foreign governments, has created boom times, with their usual stimulation of industry and business, superimposing their power demands on top of the demand pertaining strictly to rearmament operations.

Another factor materially influencing the power demand on generating stations has been the enactment in recent years of national laws operating to establish the habit of short work weeks. A survey for December, 1940, by the Bureau of Labor Statistics revealed that out of 394 factories, employing about half a million men, more than 50 percent were working five to five and a half days a week, and 75 percent of all the employees were on the daytime shift. Electricity output figures since December, however, indicate some lengthening of the hours of weekly plant operation in recent months in the industrial areas.

It is not possible by statistics to give a true measure of the engineering and operating factors pertaining to the load and ability to supply it in any particular territory or group of areas. In the first place, to collect and compile statistical data, it is necessary to set up assumed limits and definitions which fit only roughly any one area for any length of time. The true capacity of any generator is what the operating crew can get out of it under differing conditions of operation, not what is stamped on a brass plate.

Another engineering relationship that is too complicated for statistics is the capacity and output to be expected from hydro plants used alone or more particularly when used in conjunction with steam stations. In order to make a statistical tabulation of these factors, limiting conditions must be assumed. This usually means that capacity is put down at the figure that would prevail for a two-to-four-month period during a record dry year.

Next there is the question of reserves and the amount of spare capacity which should be carried. Here again rule of thumb formulas have some usefulness. They afford broad and general guides for particular and general purposes, but that is as far as they can go. The element of skill, of experience, of judgment, controls. The experience and resources of the organization operating a power system may be a bigger factor in the resulting service from it than the extent and condition of the reserves. Reports from the bombed areas of England bear out this observation.

Reserves in Peace and War

One other point about reserves should be noted. The amount of reserves which are provided for ordinary peace-time operations, affording a high degree of reliability as a safeguard to the public convenience, may not be vital or appropriate for extraordinary and relatively short-lived conditions. Interruption of an hour or even of a week or a month as to some few thousand kilowatts of capacity may be annoying or inconvenient, but it is not going to win or lose any wars. Its influence can but be trifling compared with other causes of delayed production.

Further, in trying to size up aggregate available electric capacity in any area, there is still another big factor which makes even the best statistics on capacity of limited value unless skilfully interpreted. This factor arises out of the enormous extent to which interconnections exist between power stations. Once more the answer is that judgment and

Abstract of paper to Edison Electric Institute convention, 1941.

H. C. Thuerk, Bradford Electric; Tom P. Walker, Gulf States Utilities; Justin R. Whiting, Commonwealth & Southern; C. C. Curtis, Savannah Electric & Power; Davis M. DeBard, Engineers Public Service

Col. H. S. Bennion

experience determine what capacity can be secured in a particular area, especially so in emergencies.

From the standpoint of cost and convenience, electric utilities have a monopoly of the power supply for the domestic and small commercial business and have assumed a continuing responsibility to supply such loads. They have won a large share of the business of large commercial and large industrial concerns, but because they have only a part of that business it follows that they have only a partial responsibility for supplying that class of load.

Obviously, an electric utility's first responsibility for taking care of present and reasonably probable increased power demands is to the customers, to serve which it has been built and maintained. Its responsibility to serve large industry war loads is shared by the various industries themselves, because many of them have habitually supplied all or part of their own power requirements.

The large installation program for 1941 and 1942 is generally considered sufficient to assure adequate power capacity to meet increased demands between now and the end of 1942. Adequacy in 1943 and succeeding years will, of course, depend on a number of factors. On the one hand it will depend on still further expansion of the armament program and the speed maintained in actual production; and further expansion in turn is largely based upon the foreign policy this country may decide upon. On the other hand, to balance or offset the increased power demand by reason of further program expansion there will be the additional generating capacity installed subsequent to 1942 to meet the estimated growth of demand. On this same side of the balance are factors which will exercise some compensating reduction on the over-all power demand. These factors are the taking out of the ranks of industry of additional manpower to fill the ranks of the armed forces; the curtailment of production for civilian supply because of taxation and other factors which will reduce buying power, and because of priorities and other controls of such supply; then there may be other causes of reduced or delayed production, such as strikes, the lack of ocean shipping facilities, etc. Furthermore, the working of munitions plants more days per week and more hours per day will hold demand down.

Some of the growth of demand that already has been experienced is nonrecurrent. This is true of the starting up and speeding up of operations of factories which in the summer of 1939 were idle or were running at part capacity. Much of the construction program is now completed or shortly will be, and the power consumption for that construction or for the producing, fabricating and hauling of those construction materials is over with. The expansion history of the past twelve months, however, shows the importance of watching closely the course of our foreign policy and of making some allowance for the unexpected.

While the statements of those directing the huge armament program would indicate that the peak demand will come before the end of 1942, nevertheless we must recall how greatly the program has been expanded in the past several months, and therefore should keep an alert watch for evidences of any further expansion and plan construction accordingly. In addition to keeping this sharp lookout, it is suggested that the following four steps, which many companies are following, can profitably be taken by all.

Things to Do

1. Study carefully industrial loads and means to shift them around the clock so as to produce improvement in load factor.

2. Restudy generating plant, transmission and distribution facilities, not from the standpoint of furnishing high quality service which utilities habitually strive to give their customers, but from the standpoint of what each part of the system can be forced to do if necessary to get the most out of the plant.

3. Keep well posted on load and capacity conditions in all neighboring territory to make additional interconnections as they may become useful in helping to assure an adequate power supply in all places and situations in and near the territory your company is serving.

4. Re-examine the several component loads which contribute to the system peak load from the standpoint of their importance to the national defense, with a view to determining in your own mind the order in which such loads could be curtailed.

Alfred H. Schoellkopf, Niagara Hudson Power; John L. Haley, Central New York Power; M. E. Skinner, Buffalo Niagara Electric; Charles Tattersall, Niagara Hudson Power

The Urgencies of Today

Conditions of the times make heavy demands on the electric utilities and simultaneously restrict their freedom of action as they strive to respond

PROVISION of adequate power for defense production is the first of today's urgencies confronting the electric utilities. That this duty may be discharged most competently, the utilities must deal with the next most urgent thing, which is to find a *modus vivendi* in the hard conditions that surround them. Discussion of these imperatives among those in attendance at the Edison Electric Institute convention was pointed up by five talks and papers contributed by W. P. Witherow, Blaw Knox Company; Constantine Brown, Washington *Evening Star;* W. L. Batt, Office of Production Management; Carl Snyder, economist and author; Edward C. Eicher, chairman Securities and Exchange Commission.

•

Labor, as well as industry, has a "terrific stake in the preservation of a form of government which permits free association and free operation," Mr. Witherow said. "Worker and employer stand together in this gigantic struggle for production. All are Americans. All groups stand for patriotic devotion to country. Greater understanding, co-ordinated effort and sacrifice for the common cause will surely follow."

R. M. Gates, Air Preheater Corporation; W. L. Batt, OPM; G. C. Neff, Wisconsin Power & Light

Conceding that the job ahead will require great sacrifice and will effect certain changes in our society, the speaker rebuked those who would let such considerations hinder an all-out defense effort. "It seems to me," he said, "that the development of this type of defeatist attitude would cause the only possible failure in the vast program ahead. Our great nation, founded on courage and sacrifices, has never permitted vast odds or lowering skies to dim its strength, nor obscure its purpose." Urging his colleagues in industry to concentrate on the immediate task ahead, Mr. Witherow urged: "As we put our whole hearts into the job of defending our freedom, we must face the facts courageously, and by so doing breed added courage in ourselves; we must cast aside the 'jitters'." . . .

"Let us renew our faith in the Almighty; let us disregard the whisperings and fears of the weaker hearts; let us staunchly proceed in our tasks. Let worry and doubt disappear. This country will always be great—it stands today as the bulwark of the free peoples of the world; it cannot be destroyed, save by the terror of the human heart. The people of America cannot and will not permit that to happen."

•

"There is only one way to stop Hitler," Mr. Brown asserted. "Consequently, help to Great Britain means this: that we consider the British Isles as Verdun, an outpost, a fortress to the Western Hemisphere, which we have to support to the best of our ability exactly the same way the French sent every conceivable assistance to Petain at Verdun. But had Verdun fallen then, the war would not have been over. Should Great Britain fall now—and I hope she won't—but should she, the war will not be over. It will be carried on from this hemisphere."

Mr. Brown declared that "Hitler intends to unite Europeans and then tell them that their poverty will be ended if they take the wealth of the United States, or at least share it." If the Axis wins, Fuehrer Adolf Hitler will wave the myth of "untold American wealth" before the peoples of Europe to galvanize them behind him and start the conquest of the Western Hemisphere.

We have, of course, today, two roads open to us, Mr. Brown said. "One is a little bit closed, but still can be reopened. It is the one of appeasement. The other road open to us is war. We should choose war." He emphasized, however, that "any one who thinks in terms of defeating Hitler or Germany or the Axis in a year or two or three is just fooling himself."

•

The United States will be spending 25 per cent of its national income on defense when its huge industrial machine reaches full stride, Mr. Batt predicted. All of us have to recognize that we are at a point where we are walking on the verge of war," he said. "People are going to have to go without a great many things on which they have become accustomed to depend."

He reviewed the progress of national defense, growing shortage of crucial metals, the task of spreading defense work over the entire industrial fabric of the country and the gravity of the production problem facing the United States.

People of the country as a whole have failed to understand the seriousness of the problem, he asserted bluntly. There was too much of an attitude in the early part of the defense program that the nation could take care of its defense work "on

W. P. Witherow, Blaw Knox Chester Lang, L. R. Brown and Clayton S. Goggeshall, General Electric

Saturday afternoons and Sundays" and carry on civilian business as usual, the speaker said.

Although the job is big, American industry can do it. But it can't be done with the casual approach. Defense is put first—our vitally first job —and it must come before recreation and civilian comfort.

Mr. Batt cited the tremendous upturn in machine-tool production as indicative of the growth in output to be expected in many industrial fields. "In the years 1930 to 1935 average machine tool sales of the country were running at a rate of about $100,000,000 a year," he said. "In 1939 the volume doubled to $200,000,000; it went to $400,000,000 in 1940, and in 1941 the total will be around $750,000,000. Today there are no machine tools for normal civilian requirements."

•

In words whose straightforward common sense seemed strange indeed in comparison with the tortuous economic thinking of today, Mr. Snyder stated:

"It is only as capitalism becomes the servant of the people, giving them cheaper goods, higher wages, greater buying power, that it succeeds. There is no secret about it, and yet it seems strangely foreign to our current modes of thought and feeling. If today we have or have had millionaires who have given away vast fortunes it has not been from the deprivation of the masses, but was only possible as it served the masses, made life easier, the hours of toil shorter, the goods and conveniences that they are able to command so cheap.

"So it seems to me that instead of attempting to tax this wealth away from its possessors, we should endeavor to conserve it and promote it in every way possible. Take, for example, the simply fabulous extension of the electric light. If it were not for the convenience of the people, if it did not add to their comfort and literally also to their ability to work, does any one imagine that almost every home in America would today strive to have electric lights and power for the multiplied conveniences which are now available through the cheap distribution of electricity? Who has been robbed? Who has been harmed by this process?

"Whether or not our free institutions can survive popular ignorance in this field, the strange delusion that somehow governmental expenditure can accomplish wonders now, as it never has before, only the future will reveal. We seem bent upon sowing the seeds of disaster, regardless of the clear consequences of our present course."

•

Important among the conditions in which the electric utilities must find a way to live are the operations of the Securities and Exchange Commission in its duty of enforcement of the Holding Company Act. Speaking on that subject, Mr. Eicher stated five points of policy motivating the commission in its actions. They are: (1) The commission intends to enforce the act. (2) There is nothing in the law which requires the sale of any holding company assets at unfair or inequitable prices. (3) There is no frozen period of time in which orders under Section 11 (b) (1) and (2) must be carried out, and these orders are not self-enforcing but must have court authority for enforced compliance. (4) The sale of holdings in operating companies is by no means a losing proposition for the holding company and its security holders. (5) In many instances there will be no necessity for the sale of underlying securities in the general market.

After announcing these points Mr. Eicher strongly rejected the suggestion that has been heard recently to the effect that the response of electric utilities to defense needs might be facilitated by a moratorium on enforcement of the act until the present emergency is past. He said:

"Nothing could be further from the truth. If there was ever a time when it is of the utmost importance to clear away the débris of holding company disintegration, holding company extravagances, holding company siphoning-off of assets and earnings, now is that time. Operating companies must be freed from these encumbrances so that they can go full speed ahead in serving the nation's needs.

"In short, national defense is an all-important reason for speeding up the operation of Section 11 rather than for slowing down. There is no disposition on the part of the commission to urge unreasonable haste in the enforcement of Section 11 in those special circumstances where such haste might seriously injure the security holders. But there are very many points at which the program can and must be speeded up. In those situations, especially where they relate to areas in which power needs for defense are great, delay cannot be countenanced.

"It seems clear beyond the shadow of doubt that where a subsidiary operating in a defense area can be in a better position to meet the needs of increased production if it is freed from holding company control, there from holiday company control, there can be no choice but to bring about that freedom in the very shortest period of time.

Charles W. Kellogg, president of E.E.I.; Constantine Brown, Washington (D. C.) *Evening Star;* Alfred H. Schoellkopf, Niagara Hudson Power

United Effort Is Necessary

Estimates of national income and employment point strongly to need for cooperation in electrical industry to solve defense and post-war problems

D. C. PRINCE, General Electric Company

D. C. Prince

SINCE 1920 our margin over bare subsistence has been almost directly proportional to our use of electric power in industry. With the aid of electric power the national income above a bare subsistence has been multiplied by three from 1920 to 1940, at the same time that the use of large electric power has also been multiplied by three. We in the electrical industry do not believe this is merely a coincidence.

The gross national income of the country in 1940 amounted to 82.2 billions of dollars. To earn it 47,000,000 people worked an average of 40 hours per week.

We are now definitely caught in the defense maelstrom and we may well be curious where it is leading us, and what departures from the relatively normal 1940 are in prospect. We have made the following three assumptions on the effect of the defense program: (1) That defense plus aid to Britain will be expanded to $35,000,000,000 by 1943, (2) that re-employment of 8,000,000 men and expansion of power use by 30,000,000,000 to 35,000,000,000 kw.-hr. between 1940-43 will mean that a very large part of the defense program in 1943 will be provided for by expansion of total national output, (3) that curtailment of peacetime industry will be largely confined to construction and consumer durable goods.

If these assumptions hold we may expect by 1943 to have a total national output of $110,000,000,000 which will flow from the work of 55,000,000 people working 46 hours per week. That is assumed to be full employment of all employables on an overtime basis.

Our Own Designs

At some future time—we hope it can be 1946—the war will have terminated. If it should terminate in a German victory, the 1943 estimate will serve well enough for 1946. We are committed to prevent that outcome if we are able, and since we have a way of succeeding in what we set out to do, we should at least consider the other alternative, that Hitler will have been defeated and that by 1946 we will be again free to build our lives in accordance with our own designs.

Of our 35,000,000 families in 1940, 11,000,000 had incomes of less than $1,000 a year, a bare subsistence income. As a first step, suppose these families were provided with work so that they could raise themselves to a $1,500 level—a level at which they could have some of the things required for just a modest standard of living, including automobiles, washing machines and refrigerators.

Besides the 11,000,000 families in the less-than-$1,000 per year class, there were 7,000,000 more with incomes between $1,000 and $1,500. To raise the average of these 18,000,000 families to the $1,500 level will require $10,000,000,000.

By 1946 it will require some $3,000,000,000 more than in 1940 to supply food, clothes, housing, etc., for a larger population. Also, since we do not wish to freeze the incomes of all above $1,500, we will allow this group about $5,000,000,000. We will need to spend about $4,000,000,000 more for plant and equipment than in 1940, to support these contemplated increases in consumer outlay, and for national security, which may require some $6,000,000,000 more than in 1940. It seems likely that we shall have to maintain a two-ocean navy and an expanding army and air force for some years. Also, some capital will be needed to support the development of peacetime foreign trade.

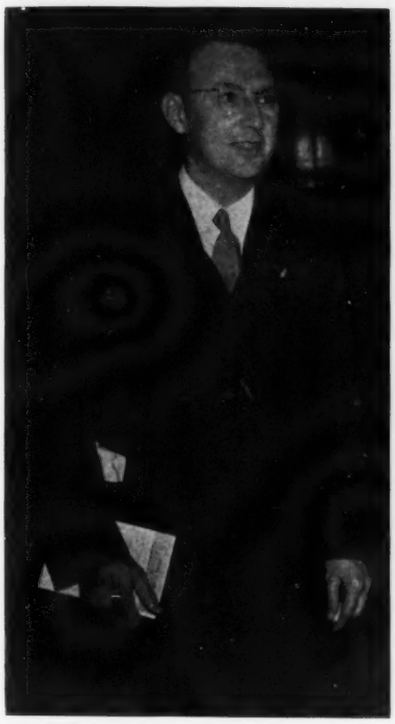
In summary, we note that by 1946 our national output should be $28,000,000,000 greater than in 1940 to do these things.

To produce this total of $110,000,000,000 in 1946 will require continuing full employment (57,000,000

[*Continued on page 174*]

Abstract of paper to Edison Electric Institute convention, 1941.

W. L. Berry and R. B. McDonald, Union Electric Company of Missouri



M. W. Smith

More Capacity for Distribution

Interconnection of secondaries to be feasible way of expandability of distribution in suburban areas, changeover dual feeds for community business area

M. W. SMITH, Westinghouse Electric & Manufacturing Company

LOOKING FORWARD to the next ten years, much of our effort will need to be applied to that part of the distribution system that lies between the two extremes of rural and highly concentrated city load areas.

This "middle class" comprises areas such as small business districts in urban communities, business districts in small towns, high-class residential areas and the like having a load density of from 500 to 5,000 kva. per square mile in contrast to the 100,000 kva. per square mile in the larger metropolitan areas and 10 kva. per square mile in the lighter rural areas. These areas do not have a load density high enough to justify the downtown type of alternating-current network, but are being subjected to continued load increase that is tending to exceed the economical limitations of the simple radial system.

In this middle class load area something should be done to eliminate the disadvantages of supplying load from single isolated transformer banks.

However attractive the idea of paralleling distribution transformers may be, it has not been actively pursued because adequate equipment that would remove some of the practical operating problems and still meet low-cost requirements was not available. It now seems possible to surmount these difficulties and limitations by adopting high production parts developed in recent years for other purposes and applying them to uses I shall mention later.

In these medium-load areas we are concerned with two types of distribution. The first type is the single-phase supply to residential and very small business centers and the second type is the three-phase supply to the larger business districts.

The ordinary single-phase system usually consists of a single-phase branch feeder, usually 2,400, 4,800 or 6,900 volts, to which distribution transformers are tapped at intervals of a few blocks. The low-voltage secondaries extending from these transformers meet about half way between transformers, but are not connected together. This connection is not made because a severe secondary short circuit will cause the nearest transformer fuses to blow, thus transferring the overload to the next units, and so on until transformer fuses are blown successively.

Banking Feasible

The inherent advantages of operating single-phase distribution transformers in parallel can be realized by a new scheme of banking transformer secondaries. It requires using low-cost circuit breakers matched to the transformer characteristics instead of the troublesome secondary tie fuses. A suitable low-cost breaker is now available and is being built on a quantity production basis in connection with the development of the self-protected distribution transformer that has come into such general use within the past five years. It appears feasible to install a second circuit breaker of this type in these self-protecting transformers for the purpose of breaking up the secondary during trouble and in this way localize the disturbance. By placing this second breaker within the transformer tank it can be properly co-ordinated with the overload ability of the transformer while the present circuit breaker is used to obtain self-protection. With this arrangement the secondary tie point is moved to the transformer.

Now consider possible improvements to the three-phase distribution. In the more heavily loaded community business centers the three-phase network system so successfully used in metropolitan areas is desirable but too expensive. At present in these community centers separate isolated transformers and secondary mains for the power and lighting loads are ordinarily used to avoid light flicker.

[*Continued on page 172*]

A. W. Hastings, Engineers Public Service, and C. C. Curtis, Savannah Electric & Power

Abstract of paper to Edison Electric Institute convention, 1941.

Whittling Trims Distribution Cost

Interconnected grounds, intensified inspection, new transformer cores, inexpensive regulators, loading economies have checked rising cost of distribution

E. S. FIELDS, Cincinnati Gas & Electric Company

E. S. Fields

ENGINEERS for the manufacturers, through contact with engineers of the utilities, have an unusual opportunity to correlate suggested ideas of individuals and advance them to a broad basis of acceptance. Further, the cooperative spirit of the manufacturers in dealing with both the individual utility engineers and the E.E.I. technical committees has facilitated greatly the development and standardization of many details that lead to economy in equipment utilization.

Distribution costs are less today per kilowatt-hour than they were ten or fifteen years ago and this trend should continue for a while at least, since more kilowatt-hours are being delivered over the lines. After the service is available the cost does not increase in direct proportion to the increase in energy delivered. One of our industry's major problems today, and it appears it will be with us for some time to come, is to continue this increase in the sale of energy without increasing proportionately the investment to serve.

About ten years ago the manufacturers and utility engineers gave united attention to grounding conditions on our distribution lines. After many trials and tests, interconnection of grounding at our distribution transformer installations became generally accepted practice. The change was not spectacular and it was added as one of the functions of the maintenance and operation crews without the purchase of new equipment. In a similar manner, primary fuses with improved characteristics were made available and their application in replacement of the older type fuses has resulted in a benefit to the system at a relatively small cost.

By combining these changes with a steadily followed program of transformer maintenance and installation inspection, a definite service improvement has been obtained at an almost negligible increase in investment. These items have decreased the outages due to lightning on the system with which I am associated at an average rate of 5 percent a year during the past eight years.

Abstract of paper to Edison Electric Institute convention, 1941.

E. F. Barrett and J. W. Carpenter, Long Island Lighting

Profitable Housekeeping

A similar program is now in operation on an eight-year schedule basis to include necessary replacement of poles and guys, rearrangement of conductors, trimming of trees, and so forth. In the areas so far included this plan has given a still further reduction of outages during storms. A large part of this maintenance is necessary in any case, and our schedule and additional work plan have effected a reduction in long-time outages at a cost comparable with the cost of repairs following trouble.

The electric distribution systems will benefit by the use of the newly developed transformer core iron and winding methods. The improvement in losses, voltage regulation and manufacturing technique are not yet appreciated fully. It is probable that the present period of this development will in the future take its place alongside the period of 1906 to about 1910, as a great forward stride in the history of transformers. It is fortunate that parallel with this transformer development the manufacturers and the utilities have been able, through a joint technical committee, to further the standardization of many details of the transformers for general distribution service. These changes mean a saving of a few dollars on each transformer and, by the standardization, our construction crews can save a few items of hardware and a crossarm. While representing only a few dollars at each installation, it will in the aggregate amount to a very sizable sum as time goes on.

It is probable that similar improvements can be made in arresters, primary fuses or switches, voltage regulators, and other service devices. Further development of this equipment, essential in any general plan of distribution, should not be overshadowed by that of new devices and ideas.

Another example of investment economy possibility has been pointed to by a subcommittee of the transmis-

sion and distribution committee in a series of studies and papers on transformer loading practices. Even a small decrease in the installed transformer capacity or, putting it another way, a small increase in load on the present transformer capacity would justify an appreciable increase in operating cost for such a program.

In the field of voltage control we must maintain our wire sizes, regulation and standards of service. Availability of low-cost voltage boosters developed by manufacturers has helped extend the area of economic voltage control. Similarly, auto-transformers have been useful for improving transformer-secondary impedance conditions in conjunction with growth of load due to appliance motor operation. We have made these additions to take care of the increased load, but we have also been required to add investment to keep the system free from lamp flicker produced by motor-starting currents.

We all realize the inadequacy of present building wiring for these modern-day loads, but it might surprise us if we knew what this inadequacy has cost us because we have tried to handle the lamp flicker problem entirely on our supply system. Quite a contributing factor to this lamp flicker trouble has been the low quality motor on household appliances. Starting currents of such motors, entirely out of line with energy consumption possibilities, have often required uneconomic additions to the distribution system to satisfy customer complaints. The distribution system operators should have a definite interest in wiring promotion plans, and their policies in handling voltage complaints should be such as to permit the customer to obtain a full perception of the cause of the trouble.

Development Trends in Distribution

Directions of development toward lower costs in distribution indicated by new things and new ideas now in hand — Standardization plays prominent part

A. E. SILVER, Ebasco Electric Services, Inc.

A. E. Silver

THE DISTRIBUTION SYSTEMS of the United States, at present, are being called upon to deliver energy at customers' premises in an aggregate more than 15 percent ahead of one year ago, and this rate appears to be accelerating. Construction expenditures for electric distribution in the United States during 1941 are estimated at approximately $300,000,000—probably as much as will be expended on all other parts of these power supply systems combined. The distribution engineer, perhaps more than any other, is "on the spot."

It is worth while and timely, therefore, to review some of those more recent engineering developments that frequently are yielding increased capability of existing facilities, increased economies in operation and lower costs for new extensions. Probably none of these practices which I shall mention are entirely novel, neither so widely established as to be termed conventional; however, their application should accelerate the trend to lower distribution investment, in terms of product delivered to consumers.

Higher Voltage Primaries — Experience has proved the feasibility and economy of distribution primary voltages of 7,200 and 7,620 phase-to-neutral. Line voltages of from 11,000 to 14,000 have been widely used for subtransmission systems serving distribution substations which convert to primary voltages of 2,400 or 4,160. In numerous cases where it has been necessary to increase capacities of such distribution systems it has been found more economical and effective to take load growth directly on the intermediate 12,500- or 13,200-volt circuits, thus utilizing these as primary systems, rather than to increase the capacities of, or build new, distribution substations and increase the number of feeders at the 2,400- or 4,160-volt level.

Bare Conductors — Weatherproof-covered primary and secondary conductors cost from 20 to 40 percent more than bare conductors of the same conductivity. In addition, bare wire has the advantages of increased safety from more positive de-energization under fault, of less burning under arc, also of being less subject to damage by wind and ice. Also it is not subject to occasional replacement on account of disintegration of covering.

Common Multi-Grounded Neutral —The wye-connected primary system with multi-grounded neutral common

Abstract of paper to Edison Electric Institute convention, 1941.

with secondary neutral may save up to 50 percent of the secondary copper along primary poles, by eliminating one secondary wire. It provides a more effective and safer grounding system. It is suited to transformers with one primary bushing and one set of protective apparatus, whereas single-phase installations on a delta-connected primary system require two primary bushings and two sets of protective equipment per transformer.

Bringing Rural Construction Into Town—The adequate service results experienced from rural lines, their largely improved appearance without crossarms and their simplicity generally have caused this design to start moving into town with benefit from lower cost and more public favor. This fits well in residential areas where, by good engineering planning, a large percentage of circuit mileage can be in simple single-phase laterals of this type.

Co-ordinated Breakers and Branch Fuses—Even with the present perfection of the automatic reclosing circuit breaker there still remains that minor percentage of cases where the circuit "locks out" and must be held off until repairs can be made, such as from a tree falling across the line, automobile collision or other strenuous encounter that cannot be guarded against. For dealing with these cases the simple single-shot type of primary fuse, installed at branch circuit junctions and co-ordinated with the automatic reclosing main circuit breaker, has much merit. The function of the single-shot fuse is to select and isolate the specific branch that is disabled, thus clearing all other sections of the circuit for being returned to service automatically.

Capacitors—Capacitors as recently improved and adapted have been applied by utility companies with a marked degree of success directly on distribution circuits. Failures in service have been insignificant. The condenser of yesteryear has been dressed up with an improved dielectric, made capable of withstanding high voltage surges and sealed in a convenient case for outdoor pole tope mounting. An aggregate approximating 1,000,000 kva. of these capacitors is now in service on utility systems.

The standard units are of 15 kva. each, of interchangeable mounting for all makes and nest compactly for either single-phase or three-phase installations on residential, commercial or industrial feeders. Advanced knowledge of dielectrics, improved manufacturing methods and mass production have provided the modern capacitor at a price to earn wide application for improving power factor, also for increasing circuit capabilities by neutralizing reactive kva., raising voltage levels and reducing losses.

Standardized Equipment and Practices—An example of the value of standardization is the result from the accomplishment, a few years past, of industry wide standardization of service meters as regards ratings and mountings. Mounting arrangements by the hundreds were in use. Mounting interchangeability for all makes was worked out. Manufacturing, stocking, installing and maintaining of meters all were simplified. While further standardization of meters may be forthcoming, present metering costs would be materially higher except for the effective work already done in meter standardization. Undoubtedly there still is opportunity for cost saving by more nearly universal application of present standard meters and metering practices.

Five years ago the habit had become widespread among utility companies to purchase "tailor-made" distribution transformers for overhead line service. Individual companies were freely specifying features special to their own situations. Manufacturers were being hard put to maintain anything like quantity production of the units that each saw fit to catalog as its standard. Price increases appeared to be imminent.

Actuated by this situation, a joint committee of Edison Electric Institute and National Electrical Manufacturers' Association has been working for nearly three years with the objective of searching out essentials in distribution transformer requirements and developing a basic standard for the guidance of both manufacturers and users. In particular, mechanical features and mounting provisions have been concentrated on. The result is that new E.E.I.-N.E.M.A. standard transformers are now available from all N.E.M.A. manufacturers in ratings up to and including 25 kva., 15,000 volts and below, single phase, pole type. These new standard transformers embody all truly essential features, and items which are not required by a large majority of users are set up in schedules of accessories available as extras.

Field savings running up to $7 or more per installation have been variously estimated by companies contemplating adoption of the new standard transformer. One company that already has had field experience reports an average field cost reduction of $3.85 per unit.

It is pertinent to know that the joint committee is continuing its work, with assurance the new E.E.I.-N.E.M.A. standard will soon be extended to cover transformers of sizes as large as customarily used for pole mounting.

James W. Tabb, Joslyn Manufacturing & Supply Company; Leo Harvey, Porcelain Insulator Company; T. J. Little, Anaconda Wire & Cable; N. F. Harrington, Cleveland Switchboard

Chester C. Smith, Kansas City Power & Light; E. D. Dreyfus, West Penn Power; C. G. Eichleberger, Cincinnati Gas & Electric; H. M. Tickle, Commonwealth & Southern

Emergency Capabilities of Distribution Plant

"It can't be done, but we do it," is distribution engineer's defi to suddenly expanded loads — There's a whole deck of aces up his sleeve

T. G. HIERONYMUS, Superintendent Underground System, Kansas City Power & Light Company

RESOURCEFULNESS, thinking and general ability of the utility engineers of the country has kept them very flexible. Not once has there been a note of pessimism or defeatism heard at any of our meetings. On the contrary, they see no reason why they cannot handle any amount of load that the defense program may require.

When a new defense plant, such as a small arms munition plant, is started near a city and the papers carry the statement that there will be over 8,000 people employed, the average person realizes very little of just what that actually represents to the power company supplying electric service.

Industrial Load Not All

A new load of 10,000 kw. at such a plant generally requires the building of one or more transmission lines direct from the nearest generating station to the plant. That is a rather simple procedure.

The real increases resulting from the defense program come in providing for those 8,000 additional people, furnishing them with homes, food, clothing, furniture, etc.

Where loads have increased in relatively small increments but to an aggregate that makes the distribution engineer sit up nights and talk to himself he has done two things. First, he has placed orders for earliest possible delivery of the necessary equipment, rearranged his circuits, robbed his normal storeroom emergency supply and kept his system operating in the usual manner. Second, he has

T. G. Hieronymus

packed his bag, loaded his problems into a brief case, and taken a trip along with other engineers from other companies to the Transmission & Distribution Committee meetings of the E.E.I., where he has aired his problems and discussed them with other engineers in similar predicaments.

Some of the problems discussed are herewith given.

Cable Loading

Just how much additional load over and above normal established rating can be put on existing underground circuits without those circuits going out of commission before the return of normalcy? Instead of 20 or 25 or possibly 30 years of useful life in a cable as at present, it might be economical so to load those cables that the life should be five or seven years, so as to get through the emergency period and then replace the circuits after the five or seven year period.

Current carrying capacity tables for heavy loaded duct lines are very conservative and it is expected that actual tests will allow an increase in cable ratings well above that used in the past.

Cable Overloading

In the case of the older, smaller, improperly designed manholes, where, in racking the cables, consideration was not given to expansion and contraction of cables due to overloading, the results have often been disastrous when attempts were made to overload such circuits. Better cable conditions can be obtained by installing flares at the ends of the manholes. Where few cables are involved complete expansion loops can be installed in the cable to relieve joints of strain.

Some companies are now stocking reels of cable twice as long as they normally would be required to use in order to bridge around a manhole that might be damaged by explosion.

It is possible to punch a hole in the wall or roof of the undisturbed manhole either way from the damaged manhole, open the joints on the cable, and splice in temporary double length sections running along the street.

Research laboratories are working on quick-setting compounds to make a quick although non-submersible joint on a cable in a real emergency,

Abstract of paper to Edison Electric Institute convention, 1941.

Granville Bourne, Commonwealth & Southern; Joseph Polhemus and George Sullivan, Portland General Electric

so that the cable may be put back in service within a couple of hours.

A sub-committee is now working on this subject with the object in view of reducing the total number of cable sizes, insulation thickness, lead thickness, etc., and more or less standardizing so as to limit stock requirements of the utility, and tools, dies, etc., of the manufacturer.

Perhaps 50 combinations might take the place of about 175 combinations now in use.

Fire-fighting Equipment

In addition to explosive violence, there is the problem of fires, especially in low-voltage heavily loaded downtown areas.

Water often does more harm than good and sand generally leaves molten slag to be removed before repairs can be started. CO_2 gas is fast and efficient and is generally conceded to be the best medium for extinguishing manhole or duct line fires. It expands three ways, cools and stops combustion even of energized cables and leaves nothing in the way of making quick repairs.

Some companies have their CO_2 equipment mounted on trailers, some on skids for quick loading on any available truck and some are equipping all substations with readily portable but smaller units.

Transformer Loading

Recent studies by the E.E.I. and manufacturers in joint committee work have determined a curve showing the expected reduction in transformer life with overload. During the emergency period it will be possible to take advantage of the fairly large overload capacity of such transformers by loading them even though life is shortened and it is necessary to replace them after the emergency period. Studies in the shop maintenance of transformers indicate that savings in man-hours and a more efficient use of existing equipment are quite possible.

Capacitors

One company installed 14,000 kva. of shunt capacitors and found the entire expense was justified by the released capacity in the distribution system alone to say nothing of the released capacity in generating stations and the improvement of voltage conditions throughout the system.

Installation of a series capacitor was made on an extremely long overhead industrial feeder with the result that the reactance of the line was practically eliminated. The customer's former load of 3,500 kva. had been approximately full load on the circuit. After installation of the capacitor, at least 6,000 kva. of usable capacity was made available to the customer.

From 20 to 30 percent of all poles now installed in overhead lines are oversize due to methods of grading to meet specifications and a leniency in engineering design. Larger poles than minimum design standards require allow much greater loads to be installed during the emergency without replacement.

Most pole lines are weakest in a direction transverse to the line. In such cases additional circuits could be accommodated with the addition of side guys. Present high ground clearances could be temporarily reduced during the emergency and allow additional circuits to be installed without pole replacement or other large changes.

Temporary Substations

Several companies have already purchased mobile or other easily portable substations for emergency use. Others have designs already made and equipment spotted for quick assembly when the need arises.

Some companies contemplate the use of pole top switches, fuses, lightning arresters, etc., mounted on low wood structures and outdoor transformers all enclosed in a chicken wire fence for quick installation where needed.

Quick restoration of service is of prime importance when emergency circuits are taken over for normal loads and high quality automatic emergency throw-over devices are out of the picture. At such times and when fires or storms are raging, the quicker men can get on the scene the less damage is done and the quicker service can be stored. One of the greatest advances toward that end is in the use of radio for emergency dispatching of trouble and line crews.

Materials

The steel situation may become critical and it may be necessary to revert to the use of more wood and other substitutes for transmission lines and substation construction.

Experiments now under way indicate that materials for painting have been found that seem to offer almost as good protective characteristics as galvanizing. Magnet wire enamels have already been completely developed that are so tough they will stand very considerable mechanical damage before exposing the wire and it is expected that such coatings will be used in many places on the distribution equipment where a protective coating for metal is required.

A. C. Blinn, Ohio Edison; Justin R. Whiting, Walter H. Sammis, R. Fleming, and J. C. Langdell, Commonwealth & Southern

Plus Values Pay Off

Confronted with cut-price competition, electric utilities must prove to their customers that their services are worth what they cost — Personalized contacts the best way

TOM P. WALKER, Gulf State Utilities Company

T. P. Walker

THE PROBLEM of substitutes—of "something just as good" at a price—is as old as merchandising itself. It has been with the manufacturer of quality branded products from time immemorial. He has grown gray and sometimes gone to an early grave trying to do something about the imitator who waited until the demand has been created; then stepped into the picture with a duplicate of the product or a reasonable facsimile thereof, at a cut price to skim the cream.

Until recently substitutes for our kind of service were offered so rarely that the problem was purely local. But now, figuratively, there is a store next door—a store operated by the biggest firm of all — offering electricity at cut rates as a side line to its many other lines. This store may not actually be in your community or mine, but through its "advertising" in the news columns, the magazines and on the radio it has created or sought to create the impression that if it were in your community or mine our folks could buy "something just as good" for a great deal less. As this firm has an excellent reputation in many fields of endeavor, its so-called public ownership cut-price competition is more of a problem than that encountered in most fields of merchandising where the cut-price manufacturer is usually an unknown quantity.

Abstract of paper to Edison Electric Institute convention, 1941.

Sell Quality, Not Price

In simple terms, ours is the old, old business problem of being confronted with price-cutting inferior merchandise offered to tear down by fair means or foul a quality product that has taken years of effort to develop. No one without the experience acquired during that development period can hope to imitate it. But judges, juries, aldermen, boards and commissioners will not yield to our fervent legal and technical pleas unless and until 25,000,000 housewives in their kitchens and 4,000,000 crossroads merchants around their cracker barrels are completely sold on the idea that their best interest is served by a trained, live business organization, fired with an aptitude for clean competition and honestly and frankly seeking a reasonable reward for its efforts.

There are two standard approaches to the price-cutting problem: The first undercuts the price cutter without regard for the consequence. The second approach retains all the necessary elements of quality which the public deserves, and maintains a reasonable price to pay for that quality.

It is only through this approach—the adding of plus values to our sales and service efforts—that we may find some hope in our situation.

Down our way we have for a long time had to think in terms of plus values, for we have had the competition of cheap natural gas for years. Never in our corporate history have we been able to say to our customers "Do it electrically because you can do it more cheaply." We have had to make the people want to pay a little more to trade with us for certain services. We offer that it can be done with reasonable success and we offer that if people will pay more for plus values in electric service, as compared to gas, they will pay more for plus values in one electric service as compared to another electric service if you can make them see that they are getting plus values for their money in paying a higher price.

Among the plus values that I would discuss with you briefly are: (a)

Joseph C. Porter, Jr., Kansas City P. & L.; Jack Poteat, General Electric

E. O. Dreas, Metropolitan Edison; Jack Lacey, Ralph Jones Company; E. J. Ingram, Metropolitan Edison

Rates as low as economically feasible but—and this is more important—of such design that they promote the widest possible use of our product; (b) an aggressive sales program either by the company or company-promoted through dealers; (c) intensified personal attention to the individual customer through company representatives having sufficient intelligence and training to handle to conclusion a maximum number of customer requirements on the first contact, and (d) a spirit of cheerful optimism and helpful service on the part of all personnel, expressed by more human understanding of the personal needs for service of our customers.

Of these, I'd say that individual treatment of the customer, the value to him of that feeling that his problems are worthy of your special attention, is the greatest plus value we can offer.

Some housewives enjoy the excitement of the day when morning callers come to the back door with services to offer or goods to sell. Many housewives, however, resent these callers and tolerate them only because they are necessary to a well-ordered way of living for them. They know the electric meter has to be read, and more often than not are not even aware of the meter reader's visit. Then there is the salesman who puts his toe in the door to tell the women that they need something which they have probably decided they can very well do without.

Then comes the collector and the appliance repairman and the home economist, and on special occasions the extra man who comes around just to find out if you are satisfied with your service and what he can do to make your life happier! All these from the electric company. Each of these utility representatives is a specialist in his job and probably a good one, but no one knows the work of the other, and too frequently has no interest in it.

A. J. Danahy and George Lien, Line Material; D. C. Bell, Bell Pole Company

Personal Attention

In our company we do not have this multi-specialist type of service, nor do we have the gold-plated district representative plan which largely fell by the wayside during the early '30s because the cost was thought too high. We do have a compromise between the two which we believe gives that personal attention to each individual customer which handles to conclusion a maximum number of his requirements on the first contact. We call these men district representatives and we require them to look over the needs of only a limited number of customers. They do the selling, the meter reading, a little of the collecting, and even some of the appliance repairs. Except for some unusual need, they are the only company representatives that see the customer at home. They have the training and the capacity, and above all the attitude toward their job which enable them to be guide and counselor rather than cause for a peeve.

The number of meters to be read in any day's work is not so great as to prevent a pause at the customer's back door to talk over matters of mutual interest to company and customer and get acquainted with the individual customer; to personalize the service.

This man does not have many skips which result in two or three months' bills rolling up before the meter can be read. Meters are read more accurately, and as he goes about he can repair an iron cord, explain variations in the bill, help arrange for a transfer from one location to another, or interpret rates. He is trained to watch for wires touching trees, house brackets pulled off from the house, improperly installed meters and other mechanical or electrical defects which might disrupt service. He knows the homes where there is sickness or misfortune and can make reasonable arrangements about payment of bills, and he knows, too, the customers who would take advantage of any yielding of proper pressure and he knows how to handle them. New customers are brought into cordial relationship with the utility family much earlier through this employee. He can judge the proper time to push the additional appliance without being in the attitude of high-pressuring the customer and he makes one contact with the customer instead of having from three to six persons calling at irregular intervals.

This man knows how to adjust almost every complaint and explain commonly used rates. He knows something of the broader features of the business, and while he is adjured to avoid controversy can hold his own in debate where his company and its practices are being discussed. He is in fact quite competent to interpret the company clearly and sympathetically to the customer and the customer in turn to the company.

Customers Like It

This is plus service and it is the sort of plus service that is welcomed by the customer and that pays off much more than its actual cost.

With bold rate policies that refuse to sacrifice sound practice for expediency; with aggressive promotional sales effort and education; with a streamlined organization which puts on the firing line sufficient brains and authority really to serve the customer in a personal way, and through a new emphasis on an attitude of willing and enthusiastic service to the individual needs of human beings, may we come to an awakened appreciation of our own abilities and opportunities and assert an inspired leadership for thousands of loyal fellow-workers anxiously waiting for a confident word of encouragement to carry on to greater heights than we have ever before dreamed were possible.

No Relaxation of Sales Effort

Defense demands on electric utility services do not justify any let-down in selling — Rather, they call for a greater sales responsibility against the day when the emergency is past

R. E. FISHER, Pacific Gas & Electric Company

R. E. Fisher

OUR INDUSTRY must realize that the expanded activity in every line of industry due to the National Defense program will produce only an illusion of greater prosperity—not an economically sound, lasting prosperity. A war-time economy cannot be measured with a peace-time "yardstick."

Business men who lessen their sales efforts because they are in a seller's market are not building for the future. Momentum must be maintained so that when defense work slackens the impetus will have been provided for expansion of normal activities to take up that slack. Unless business disciplines itself to a policy of long-range market development and sales work, we shall once again be caught as unprepared for peace as we found ourselves unprepared for war. While we are shouldering defense responsibilities we must, therefore, sustain our selling program to keep our product in the public eye so we will not lose place, position or identity—the essentials to continued successful operation. This year's customer is not necessarily a customer two years from now. We've got to keep him that way!

Prepare for Tomorrow

These "come-and-get-the-order" days create a situation which extends throughout all industry. It is something that has to be—we couldn't stop it if we wanted to, and we don't want to because it is the only way we can do our part in the defense program. Nevertheless, during this forced-draft seller's market we must face the facts and prepare for the future. Business-building and customer-holding tools will be sharpened now by the far-sighted executive.

The challenge confronting the electric industry today is load building, with emphasis on fuller use of existing facilities. The electric utilities have a use factor that is still below 40 percent. If the valleys of our load curve can be filled the present generating capacity can comfortably furnish many more kilowatt-hours without danger of shortage. We point with pride to the engineers of the electric industry who have made it technically possible to give our customers more and more for less and less. While much progress has been made in production, transmission and distribution efficiencies during the past two decades, the trends definitely indicate that further gains in technical efficiency will be smaller and more difficult of achievement. Notwithstanding the contribution of our engineers, they are now challenged to build and operate systems which must compete profitably with tax-free and federally-subsidized government systems. Another challenge confronting the utility industry is an aroused public opinion that demands a rate ceiling so low that net revenues are constantly threatened. Simultaneously, our industry is confronted with new light sources of high efficiency, new appliances and new processes, all of which hazard a threat of reducing the gross from which any net earnings must be skimmed. The best answer to these challenges lies in building new load and, to a large extent, keeping our existing business sold.

It has been stressed that one sales responsibility confronting us is the sustained development of the domestic market. If we continue properly to build up the residential load it will in the future become a badly needed shock absorber to cushion the abnormal transition from war to peace.

Another sales responsibility is that of continued personal contact with our commercial and industrial customers. While it is true that the actual selling of additional power can hardly be called a sales task for the average utility today, nevertheless, hand in hand with this job is the responsibility of keeping our service sold. Periodic systematic contacts with our industrial customers on a personalized basis are fundmental if we are to know these customers and their problems. If we are to build business in the commercial and industrial field it is our duty to be just as zealous in our effort to serve our present customers properly as if we had a hundred competitors. If we relax in this job future competition from other sources of power may cause utilities more concern than heretofore.

Personal contacts with domestic as well as commercial and industrial customers will also enable us to safeguard against favorable developments being minimized or minor evils being exaggerated. Customer opinion surveys during recent years have dis-

[*Continued on page 175*]

Abstract of paper to Edison Electric Institute convention, 1941.

George A. Hughes Award (Left)—Harry Restofski, West Penn; R. B. McElroy, Washington Water Power; H. G. Isley, Carolina Power & Light; George A. Hughes. *B. C. Forbes Prize* (Center)—J. R. Jarnagin, Carolina Power & Light. *National Water Heating Council Award* (Right)—H. E. Simpson, Florida Power & Light; Jack Poteat, General Electric; Kinsey Robinson, Washington Water Power; F. A. Coffin, Wisconsin Power & Light

1941 WINNERS OF INDUSTRY AWARDS RECEIVE

Reddy Kilowatt Award (Left)—Ash Collins and Charles R. Preston, Kansas Gas & Electric. *Thomas W. Martin Award* (Center)—C. H. Leatham, Monongahela West Penn Public Service. *Claude L. Matthews Award* (Right)—Edwin Vennard, Middle West Service Co., accepting award for J. B. Handley, West Texas Utilities; Claude Matthews

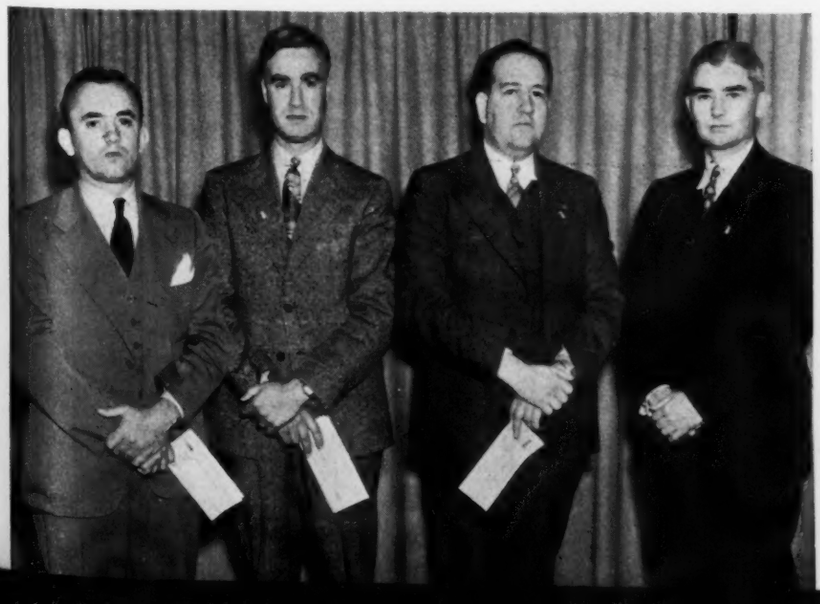
Augustus D. Curtis Award (Left)—Seated, F. J. Vorlander, Darwin Curtis and J. E. Pittenger, Philadelphia Electric; standing, W. L. Argus, New Orleans Public Service; E. G. Mortensen, Nebraska Power. *James H. McGraw Prizes* (Right)—S. B. Williams, Editor of Electrical World; E. B. Woodruff, Cincinnati Gas & Electric; J. M. Mousson and W. B. Hess, Safe Harbor Water Power Corporation; Frank F. Fisher, Detroit Edison

Laura McCall Award—Elizabeth Murray, Atlantic City Electric; Camille Davied, McCall's; Leona Berlin, Indianapolis Power & Light

THEIR PRIZES

Charles A. Coffin Award—Stuart Crocker, General Electric; C. E. Kohlhepp, Wisconsin Public Service

R. B. Marshall Award—A. W. Zagray, Ohio Power; L. N. Rothermel, Northern Indiana Public Service; A. B. Coleman, Kingsport Utilities; R. B. Marshall



A Design for Living

Three-bedroom home at $3,500 which is ready for occupancy in ten days uses 3,469 kilowatt-hours per year

HENRY J. MORTON, Pierce Laboratory, Inc.

LOAD-BUILDING PLANS subsequent to the expiration of the present debacle are receiving serious study. There is hope that domestic and small commercial users can be persuaded to take up most of the "slump" which will ultimately result.

Economic possibilities of a larger percentage of home ownership has been receiving considerable attention for many months by both industrial and governmental personnel. An active home-building industry may be a valuable contribution to offsetting the reaction and the aftermath of what is now happening.

Mechanical assembly of a shelter is tradition-bound and custom-dictated. Until recently there hasn't been a major change in over 300 years. A village of twelve newly designed units has been constructed and the houses rented to families of average class. The assembly is unique and a departure from all traditional practices. The principal units in construction are twenty wooden girders which encircle the house above and below

Abstract of paper to Edison Electric Institute Convention, 1941.

Henry J. Morton

the windows. The parts are shop cut to dimensions. Exterior panels and exposed wood members are made from phenol-impregnated plywood and coated with paint at the fabricating shop. The building foundation consists of a dozen concrete piers with a curtain wall between set 3 ft. below grade. No basement is needed. A large share of the furniture has been built into place.

The few homes already constructed are heated with oil-burning equipment—all other functions are performed electrically. Cooking, refrigeration and water heating are done by simplified editions of what has been customary practice.

Average electrical consumption for nine homes has been 3,469 kw.-hr. per annum. The average size family

[*Continued on page 176*]

Promotion Sells Service Values

Accelerated sales of appliances and electricity are only part of achievement of joint promotional activities — Just as important is public acceptance of the value of electric service

C. E. GREENWOOD, Edison Electric Institute

C. E. Greenwood

THE ELECTRIC UTILITY INDUSTRY has registered praiseworthy achievement over many years in pioneering and promoting household appliances for utilization of its service. Managements, however, have accepted too generally the thesis that every one wants and must use electricity, and all that is required to load the generators is a little advertising and selling. They do not go as far as one of the nation's lawmakers at Washington last month who stated that "it is not necessary for any company in the light business to advertise." That gentleman is budding 80 years of age and such a childish statement may be excused.

It was in 1927 that leaders of commercial thought in the electrical industry, foremost among them James E. Davison, now president of Nebraska Power Company, were instrumental in having set up in the utility trade association a department for national and local co-ordination of sales and promotional activity, and for general assistance to member companies for commercial research and market study.

The primary consideration of utility service is use. The old axiom "You can lead a horse to water but you can't make him drink" fitly applies to consumers of electricity, because "we can expose people to electrical equipment, but we cannot force use." Of course, some use is expected, but my theme is the volume use of service which makes it possible for the company to offer, and for consumers to earn, the continuously lowered cost of service, which has been one of the outstanding achievements of our industry.

Better Light-Better Sight—Out of the economic doldrums existing in 1933 sprang the will to organize industry activity. The Better Light-Better Sight movement organized utilities, lamp manufacturers and numerous other associated interests through Edison Electric Institute for national promotion. The optical industry and the electrical industry have a common purpose in eyesight conservation, and through the bureau they may pool special knowledge and experience. The bureau is now in its eighth year of sustained effort and is taking hold of public thinking. The curve of sales of light bulbs in wattages of 60-watt and below levels off from 1936. And there is a sharp upward trend in bulbs of wattages over 60-watt, which shows that customers have been enlightened on the use of higher wattage.

Electric Refrigeration Bureau—As a greater market was opened up for refrigeration as a public and family need, it was pointed out by the Electric Refrigeration Bureau, which was organized in your association to succeed the Food Preservation Council, that the electric ice box met the requirements for economic savings in food storage and for keeping food fresh for family use, better than any other method existing at that time. The bureau functioned for four years with startling results, even through depression years. The record is summarized by a quotation from a recent report of the Metropolitan Life Insurance Company: "Since 1927 there has been a reduction of 83 percent in deaths due to food poisoning. The increased use of electric refrigeration and better hygenic conditions are responsible for this showing."

Modern Kitchen Bureau—The electric refrigerator was a first step in further electrification of the kitchen, and expansion of this promotional effort was a natural progressive move. It was timely also, because then the Federal Housing Administration came into being to give impetus to the previous attack of the electrical industry on the sale of complete electric kitchen equipment.

In 1933 the Modern Kitchen Bureau was established to enlighten home makers on the value of the

[*Continued on page 176*]

Abstract of paper to Edison Electric Institute convention, 1941.

W. R. Von Steenburgh, Okonite, and George M. Gadsby, Utah Power & Light

Bases for Interconnection Agreements

Need for comprehensive system interconnections, much of it already fulfilled, is a normal development in electric service growth that is now accelerated by defense power requirements

J. E. MOORE, Ebasco Services, Inc.

TODAY a new emphasis and in some respects a new significance attach to the benefits realizable from system interconnections. In particular, the impact of the defense program upon electric power systems is just beginning to be appreciated, for the reason that the defense program itself is just beginning to be understood. When the magnitude of the defense production program doubles within a period of relatively few months, the power requirements for that production likewise double. Where the progressively increased production will be located and where the progressively increased amounts of power will be required are questions the answers to which are only partially known. Many new loads will have to be served in 1942 and 1943 which, as to particular localities, are not even prospects now.

Interconnection and co-ordination of existing power sources will have a vital part in answering three outstanding questions as to defense power supply—How much? How soon? Where? They have also a bearing upon the less urgent but not unimportant problems of minimizing the economic loss in the post-war period resulting from heavy local overdevelopment of power generating facilities.

For operation in 1942 no new generating units of economic size, other than those now in process of construction, can be made available. For operation in 1943 the situation as to manufacturers' facilities and floor space, and as to critical materials and skilled labor, definitely limits the aggregate capacity of new generating units which can be produced. This limited aggregate of new units must be divided between utility system plants, large industrial plants and government plants. Priorities may affect unexpectedly the destination, as to specific localities, of the generating units which can be produced for 1942 and for 1943.

Abstract of paper to Edison Electric Institute convention, 1941.

More Than Realized

However, both for 1942 and for 1943, an amount of effective load-carrying capacity can be made available by suitable interconnections which will constitute a far larger addition to our power resources than is generally recognized. If intelligently planned and located, if carefully co-ordinated with existing transmission facilities, production sources and distributing centers, and if operated with full effectiveness, these interconnections will not only create substantial new load-carrying capacity, but they will do it quickly, with reasonable economy and without serious inroads upon critical materials. They will have the advantage of making both existing capacity and new capacity available over wider areas, a tremendously important advantage in view of present uncertainty as to where greatest power demands will finally materialize. Later, such interconnections should assist significantly in meeting post-war economic problems.

Viewed merely as a method of gaining additional capacity which is alternative to construction of new generating facilities, interconnections will often show greater over-all economy, both from a short-range and from a long-range viewpoint, but in many situations the issue is not one of alternatives; it is one of urgent need for all the additional capacity which can be got by both methods.

J. E. MOORE

Moreover, the new significance attaching to system interconnections does not arise solely from the defense emergency. The electric utility industry would in any event still be facing the problems of growth, not merely growth in magnitude of loads and facilities but growth as to character of facilities and as to methods of operation. The evolutionary development of the industry is reaching a stage when most systems, which do

Harry P. Field, Hawaiian Electric Company, Ltd.; J. W. Hickland, General Electric; D. E. Stultz, Potomac Edison; W. P. Cochran, Westinghouse, and Purcell L. Smith, Middle West Corporation

not already have external interconnections, do have internal high-capacity networks which are natural bridgeheads for interconnections. It is reaching a stage also when existing co-ordination may need to be extended and when isolated or semi-isolated operation of power sources will often no longer stand the test of maximum adequacy and flexibility of available power supply at minimum cost. The industry must and will meet the coming problems of growth by whatever means may be required to meet them.

(EDITOR'S NOTE—In the body of his paper Mr. Moore presents detailed discussions under the headings: "Benefits from Interconnection and Co-ordination of Power Supply," "Nature of Transactions in Interconnected Operation," "Natures and Types of Interconnection Agreements," "Scopes of Interconnection Agreements," "Types of Interconnection Situations," "Interconnection Investment Arrangements," "Forms of Interconnection Agreements," including schedules covering load diversity, hydro capacity, reserve, emergency and economy interchanges as well as firm and dump power.)

Different Ownerships No Bar

The primary purpose of this paper has been to develop the fundamental economic and strategic factors involved in potential interconnection situations, and to indicate that analysis of these factors leads to the conclusion that diversity of ownership need not and should not be a significant obstacle to interconnection of power systems and co-ordination of power supply. A secondary purpose has been to suggest, for assistance to those engaged in actual drafting of interconnection agreements, certain possible types of contractual provisions.

The great power supply systems of this country have been created and developed by privately owned utility companies. The responsibility for power supply in this country today, in consequence, rests predominantly on private enterprises. The responsibility is growing and these private enterprises must grow, both to safeguard vital defense needs and to meet the expanding requirements of the future. The industry is in a stage when this inevitable growth must involve still further interconnections of power systems and increasingly greater co-ordination of power supply sources. This trend toward co-ordination does not evidence merely a passing need created by the immediate and urgent demands of the defense emergency, it is inherent in the development of the industry. The conclusion is important, accordingly, that diversity of ownership is not an intrinsic obstacle to co-ordination of power supply and that construction and ownership of interconnection facilities lie within the natural field of private enterprise. Private enterprise should and will make the program its own.

Successfully Demonstrated

Such conclusion is indeed amply supported by what has already been done in the industry. Large-scale and thoroughly effective power co-ordination between independent systems had been demonstrated to be successful a dozen years and more ago. But the conclusion is now stressed because of a possible feeling that examples of successful co-ordination represent a triumph over heavy handicaps. In fact, they succeeded primarily because the underlying conditions were inherently favorable to success.

The principles out of which successful co-ordination develops are (1) sincerity on one's own side coupled with confidence in the integrity of the other side, (2) contractual and working procedures sufficiently definite to get things done and sufficiently flexible to meet changing conditions, and (3) courage to face new ways of doing things and to seek new levels of industry effectiveness. On this basis the privately owned utility systems in this nation may continue their creative progress in the future, as in the past.

S. A. Wills, R. S. Musgrove and R. E. Wagenhals, Appalachian Electric Power

Instrumentation Gives Gain in Hydro Output

Avoidable watts and energy losses reducible by instrumental and alarm aids to operating personnel intent on the maximum efficiency*

W. B. HESS† and J. M. MOUSSON‡ Safe Harbor Water Power Corporation

OPERATING EFFICIENCIES of hydro-electric plants are admittedly difficult to control. Mechanical efficiency and capacity of individual units have been increased, thus decreasing the number of units required in a plant, simplifying operation and improving over-all system economy. Progress has been made in clarifying the complex problem of load dispatching in accordance with intricate load studies based on unit and plant economies, system requirements, interconnections and river flows. Between these two areas of improvement there is an area which has been left almost entirely to solution through the medium of the human equation—the most advantageous operation of individual units in a multi-unit plant.

Installation of measurement and control-indicating equipment at Safe Harbor has resulted in an increase in annual output of some 5,000,000 kw.-hr. Coupled with this was an intensification of the zeal of the operating staff, which was encouraged by a realization on the part of the operators that their judgment was to be supplemented by mechanical devices which would allow them to focus their attention on more advantageous scheduling of individual units. Safe Harbor is considered to be a plant in which the nature of the system load fluctuations necessitates quick station response without waste of water, and therefore one in which even small loss eliminations are important.

In general it is believed that the field of hydro operating efficiencies is not the exclusive responsibility of the operators, but also that of the engineers to provide equipment making it possible for the station personnel to get best results. Operators can in this way give individual attention to their varied operating duties without being preoccupied with station and water economy. At Safe Harbor the operators' attention to such matters is required only when an automatic warning is given of change in conditions which warrants change in operation.

Piezometer Installation

Each of the main and service unit scrolls is equipped with a piezometer system (Fig. 2). The discharge through a turbine and the differential

* Excerpts from the EEI paper which was awarded the first of three James H. McGraw prizes for "most meritorious on any engineering or technical subject relating to the electric light and power industry."

† Test engineer. ‡ Hydraulic engineer.

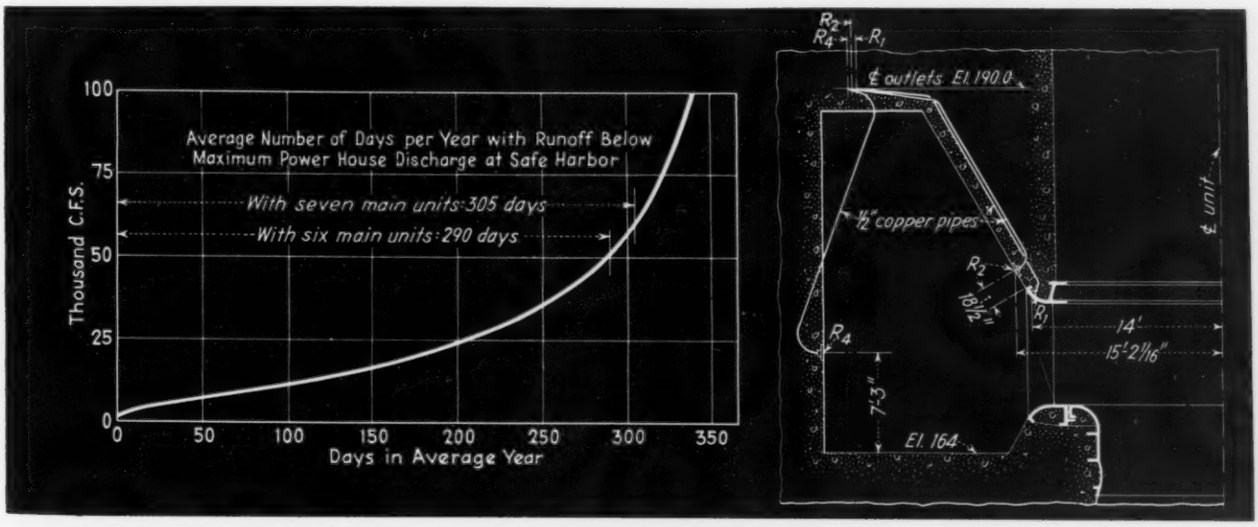


FIG. 1 (left)—For about 5/6 of the average year (305 days) the average river flow of the Susquehanna is less than the Safe Harbor draft required for seven 42,500-hp. units and two 3,100-hp. station service units at maximum capacity. FIG. 2 (right)—Safe Harbor main units have Winter-Kennedy piezometer systems in scroll cases

pressure of two opposite piezometer taps connected to a flow meter are related in accordance with the equation $Q = C \times \sqrt{D}$, where Q is the discharge measured in cubic feet per second, D the differential piezometer pressure in feet of water and C a coefficient determined by means of calibrating data obtained during the turbine acceptance tests.

The flow meters selected employ a rather unique principle, their design being based on the fact that the centrifugal force exerted by a flyball system driven by a motor integrator has the same relation of the rate of rotation that the differential piezometer pressure has to the rate of flow, thus leaving a direct proportional relation between flow and integrator speed. A counter geared to the integrator shows revolutions in terms of flow. Impulses for remote discharge indication and totalizing are obtained from an interrupter mounted on the countershaft.

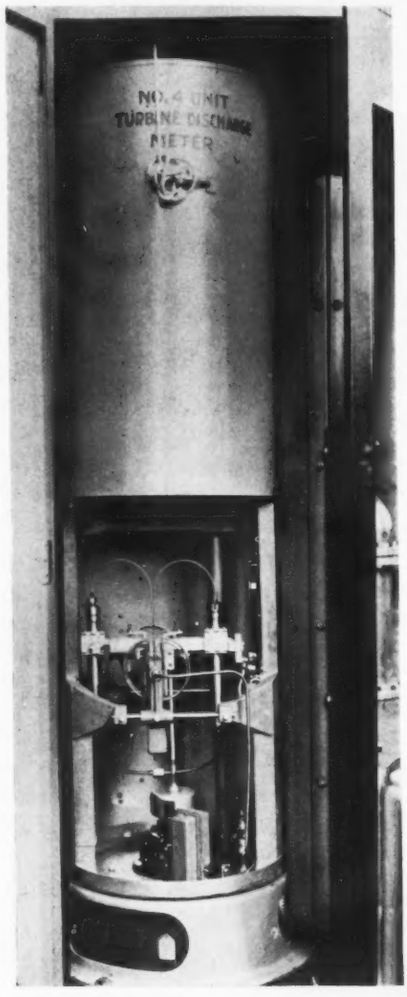


FIG. 3—Typical flow meter in unit gage board cabinet on generator floor

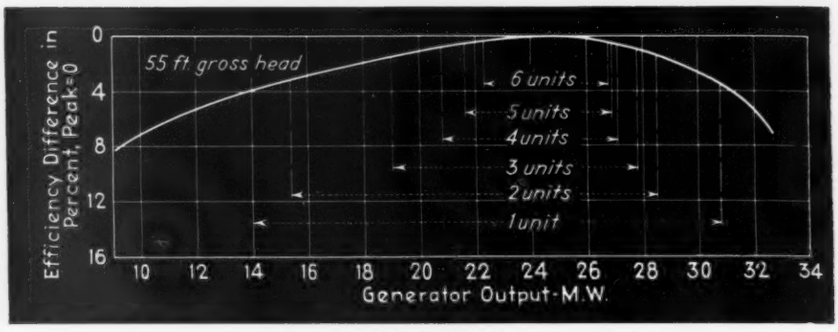


FIG. 4—Typical loading schedule for main units

The remote totalizing apparatus is located on a panel of the relay board in the control room. While three of the four totalizing relays serve as unit discharge totalizers for a group of three turbines each, one relay is used as master totalizer for the entire station, giving the sum total of the three unit totalizing relays. The station-total discharge counter is mounted below the totalizing relays on the same panel. Individual unit discharges can be determined from readings of the individual counters of the unit totalizing relays. A station total discharge graphic recorder and indicator combined in one instrument is installed on the instrument panel located opposite the totalizing relay panel. The pen and indicator of this recorder are actuated by an integrating device totalizing flow every two minutes. At the expiration of each two-minute interval positioning takes place corresponding to the average rate of station discharge during that interval.

To appreciate the investigation regarding operating performance, it may be well to discuss first the typical loading schedule of the units, Fig. 4. From this ideal schedule valued for a gross head of 55 ft. and similar to that for any head condition, it is apparent that the band of permissible load variation of each unit decreases with increasing number of units on the line. With the seventh main unit placed in operation, this schedule is now the same in principle except that the permissible load variation of individual units with all seven main units operating is somewhat narrower than that in force when only six units were available. Under capacity requirements beyond the most efficient station operating range, all individual unit loadings are increased by equal amounts up to the point of maximum capacity.

In view of the above, the determination of avoidable losses due to inefficient operation dealt primarily with the deviation of actual operation from the ideal requiring the running

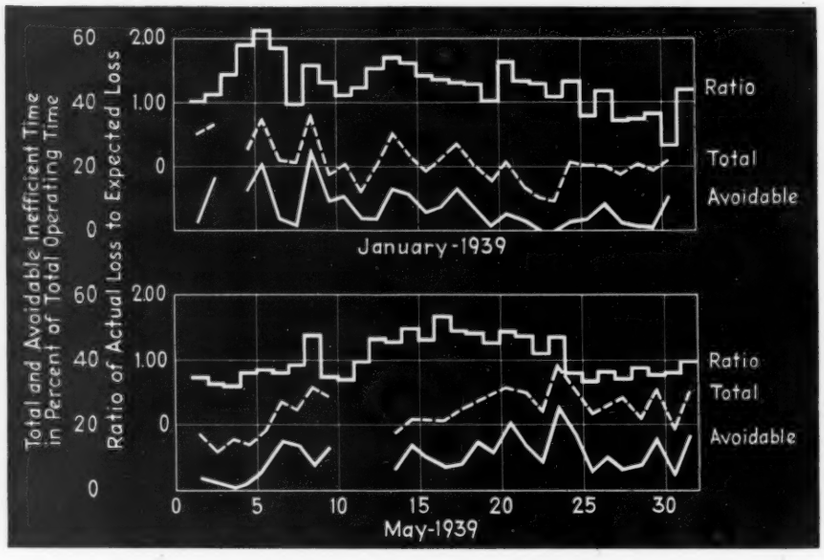


FIG. 5—Reduction in inefficient operating time and in ratio of actual to expected loss effected between January and May, 1939

of the proper number of units for given load in accordance with the preferred order and equal load division between all main units on the line. To obtain the basic data for this analysis the operators were required to read the individual unit discharges and the station draft every hour on the hour, together with the watt-hour meters as well as the forebay and tailwater indications. Comparison of the actual operating losses based on input and output for any given day with the predetermined expected losses based on maximum unit efficiencies results in a measure of the avoidable inefficient operation being obtained for that day. The data thus obtained for an entire year were plotted as shown on Fig. 5, illustrating the results for January and May, 1939.

Daily Losses

The daily avoidable losses due to inefficient operation were consolidated as shown in Fig. 6, representing the results for a whole year. As there were innumerable points, these are not shown individually. It is important to note, however, that there was no concentration at any particular location, but the individual losses plotted were well scattered and equally distributed over the shaded portion of the diagram. From the shape of the shaded area it is apparent that the percentage loss due to inefficient operation is increasing with decreasing station daily output. This is not surprising, as during the low flow portion of the year relatively more pronounced load variations must be dealt with, so that with decreasing runoff the frequency with which units are to be placed on or off the line is rapidly increasing if the ideal loading schedule for best efficiency is adhered to.

The shaded portion of the diagram, Fig. 6, could also be used as a basis for estimating the avoidable loss in generation. Assuming, for instance, that the operating performance could be improved to be at all times equal to the best found in course of these investigations—that is, along the lower boundary of the shaded area—the average gain in daily generation would vary between 1.5 and 0.5 per cent—that is, half the shaded area—resulting in a yearly gain in generation of more than 4,000,000 kw.-hr. or 4,500,000 kw.-hr. for the average low flow period and the six or seven main unit installations, respectively. However, as generation even at its best was far from ideal, substantial additional gains could be expected provided proper measures could be found to assist the operators in reaching further perfection in operating performance.

Obviously, not only the knowledge as to the magnitude of inefficient operation was of importance, but the cause and time interval during which the loss is sustained. For this reason the charts from the total station discharge recorder were analyzed in the light of the operator's log. In plotting the permissible discharge ranges for any given number of units in accord-

[*Continued on page 179*]

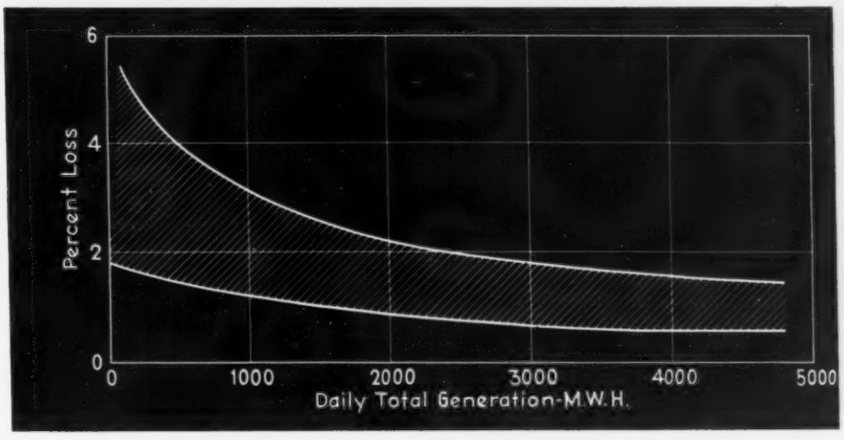


FIG. 6—Range of magnitude of losses due to all causes of inefficient operation

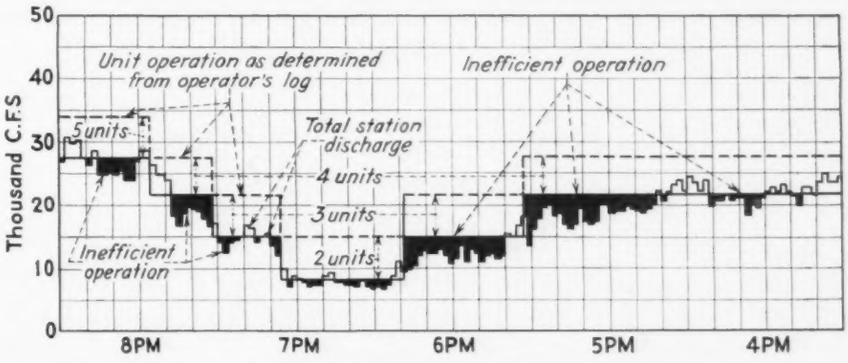


FIG. 7—Shaded area of inefficient operation due to operation of too many units

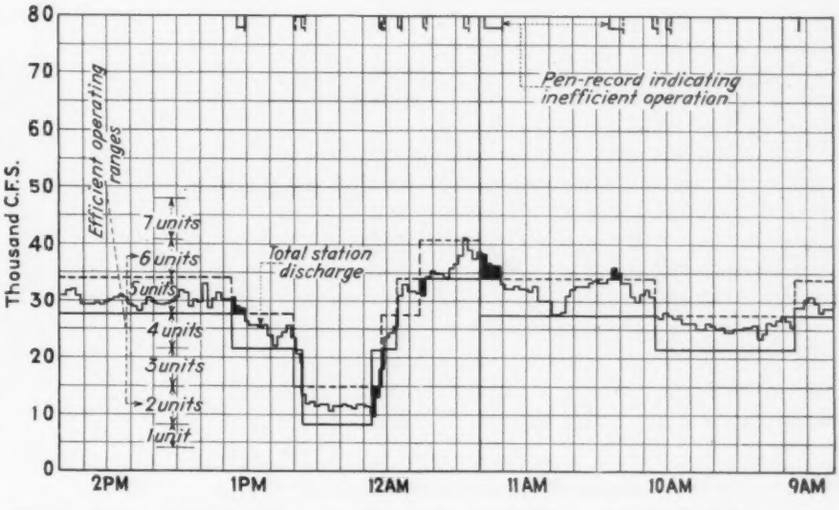


FIG. 8—Station total discharge recorder chart amplified to show reduced areas of inefficient operation obtained by observance of load limit warnings

Editorials

S. B. WILLIAMS, *Editor*

What Are the Power Shortage Facts?

IS THERE going to be a power shortage? The chairman of the Federal Power Commission seems to think so, likewise Secretary Ickes and OPM. In fact, Chairman Olds states he cannot overemphasize the gravity of the present power situation, and he puts this fall as the most critical period in the history of the utility industry.

Of course, if the drought in the Southeast and in New England and in the Rocky Mountain states and the Northwest continues through to the end of the year, some very serious situations are bound to develop. But already the rainfall deficiency in those areas has passed previous records or come close to it.

In the affected areas there is enough power, but not enough water. In other words, the capacity is sufficient, but the visible supply of kilowatt-hours is low. The correction for this is the same as our municipal water supply departments frequently impose in the summer months—temporary reduction in non-necessary usage until the supply improves. Voluntary reduction of this nature is now under way among the Southeastern utility customers.

The picture that Mr. Olds paints, however, goes further than the temporary shortage caused by low water. He emphasizes the demands of the rapidly expanding defense industries. Every one knows of the mounting sums being called for in this preparedness effort. The production of aluminum, for instance, is scheduled to double. How much of this expanded effort is to go into operation before the end of this year, how much next year, and so on?

In other words, what are the facts?

The power industry, as we have contended for the past five years, has provided capacity to take care of all power demands in sight plus a liberal reserve. If given notice now of the size of the new loads and the probable time they will come on, the power industry will find ways to take care of them. However, this does not mean that any amount of load can be piled into one system and get served. That is the trouble in the Southeast today. It was politically expedient to show how important in the defense program was the government-owned TVA. Left alone, the power companies and TVA would have met this low water condition without recourse to rationing. The present situation in TVA, however, is but the curtain raiser to the shortage predicted for next year, even if water is normal. And the same thing is expected to happen this summer out at Bonneville, where new loads have been politically placed without regard to sound principles. When politics replaces management and engineering the politicians should not holler if things get balled up.

The suddenness with which this threatened power shortage arose is one of its great mysteries. FPC has the authority under a 21-year-old act to order conditions to improve energy supply during war or "whenever the commission determines that an emergency exists by reason of a sudden increase in the demand for electrical energy." So far the FPC has hesitated to exert this authority. Can it be that this power shortage scare is for the purpose of securing public blessing for the exercise of this authority?

This seems likely in view of the fact that the commission's approach to the problem was one of chastising the power companies in public print for not providing more facilities, particularly interconnection.

The commission has been urging the utilities for a long time to provide a grid covering the Eastern industrial area. The utilities have made a comprehensive engineering study which shows little advantage on the basis of diversity to be gained from such a grid over present interconnections. The act appears to give the commission full power to order such a grid or any interconnections.

It is amazing that nobody in Washington who was close to the defense program had any idea things were so critical until comparatively recently. Chairman Olds in speaking to reporters admitted that national defense officials had not anticipated the present demand for power two months ago, and he might have admitted that that went for FPC as well.

Last fall FPC anticipated a shortage of 1,500,000 kw. in 1942 and around the first of the year revised this figure sharply down. Less than two months ago, after complimenting the utilities for the job they had done in preparing for National Defense, at Manhattan College Mr. Olds postponed the date of a power deficiency to 1943.

If the National Defense Administration and the Federal Power Commission had no knowledge of loads that might double in six months, should the power companies know? How perfectly ridiculous!

Did the FPC ever furnish power companies with the information on probable power requirements gathered last fall from manufacturers? What did it show? Did the manufacturers themselves know?

OPM is reported by Secretary Ickes to have stated that a million more kilowatts than are now on order will be needed in 1943 and 1944 to serve the increasing

defense load. While this sounds too much like a figure pulled out of the air for a purpose, if it is a true figure it ought to be broken down as to place, quantities and time. It is a figure that the industry would normally meet under increasing load conditions. Nevertheless, it looks more like an invitation to build a million kilowatts more of government-owned hydro power.

We are not trying to assess blame for some condition that might but probably will not occur this fall. What we are saying is that trouble can be minimized if those in Washington who are administering the Defense Program will work with the utilities without rancor, just as they would any other raw materials industry.

The power industry has been better than any other raw material producers in serving the National Defense demands, but it never has been and never will be a soothsayer.

Of Words and Engineers

PERHAPS it is too much to expect of a technical and business publication like ELECTRICAL WORLD that it shall be always a model of grammar and of rhetoric. As a matter of fact there are those who would say that no such expectation, nor anything approaching it, was ever held by any one.

Yet there are editors of such publications who do feel a certain responsibility for the integrity of the English language and who will be immensely cheered to learn that at last an engineer has been moved to protest against what his fellows are doing to the mother tongue.

Cecil W. Brown, director of engineering, Connecticut Power Company, sends us a copy of a letter written by him to the Industrial Data Sheet subcommittee of the National Safety Council in which he takes "violent exception" to the use in the data sheets of the term "flammable," evidently in the sense of combustible. Mr. Brown asserts there is no such word in any dictionary and that its coinage is unfortunate. He points out that to express its opposite by the use of the prefix "in," as "combustible" is changed to "incombustible," would result in the perfectly good dictionary word "inflammable," of which the meaning is exactly 180 degrees out of phase from what the prefixer intended.

Probably engineers are no more prone than ordinary folks to manhandle the King's English. It may be they only seem to be especial offenders to us because articles by engineers are mostly what come to ELECTRICAL WORLD. The editors of a medical publication might maintain that doctors are much more diligent mutilators of language. However, we elect to cast our aspersion at the engineer, not alone for the trespass on lexicology so bitterly protested by Mr. Brown, but for his persistent use of "due to" when he means "because of"; of "either" as more elegant than "each"; of "different than" instead of the correct "different from"; of "balance" in place of "remainder"; of "same" for "them." These are only a few of the solecisms noted in engineer-authored articles as they pass over the editor's desk. A complete record would be too heavy an indictment; besides, there is not space to print it in the pages of this magazine.

Humanized Annual Reports

THE TREND toward simplifying and humanizing of annual reports, which started a few years back, has spread to a remarkable degree among electric light and power companies. This year the number of humanized reports was far in excess of those for any previous year, as noticed in the entries of the Reddy Kilowatt and the Public Utilities Advertising Association awards.

This is one place a company can create a better understanding of its business and show the part it plays in the economy of the community it serves. Why, then, should the distribution thereof stop with the stockholders? Some companies do distribute their reports to employees, but why stop there?

Some of these reports are the best answer in the world to the questions that come up to bother utilities. They may not all be done in the finest manner, but they do show a sincere desire to tell the facts in a way that can be understood. We think the customers would like such reports.

Interconnection Agreements

AN AMOUNT of effective load-carrying capacity far larger than is generally recognized can be made available by further strategically placed interconnections. They can do it quickly, whatever may be the delay in fabricating turbo-generators not already on order. They can if the fear about contractual complexities is not allowed to be a deterrent to prompt and judicious decisions. Remaining areas of favorable load diversities, diversity in demands upon reserve facilities, economies of power interchange, opportunities for staggered additions, mutual protection against unusual situations can all be cultivated advantageously.

Without waiting for pressure from governmental agencies, there could well be, right now, a number of conferences between contiguous properties, regardless of differing ownerships, to lay the plans for lines that could thereupon be built as soon as their need is well established. Contractual relations could be drafted on an as, if and when basis.

The way to accomplish this was admirably set up in J. E. Moore's paper at the recent E.E.I. convention. His presentation is a masterpiece round-up of basic principles; it lays the foundation and outlines the details for any likely eventuality. It shows how to satisfy the lawyers and still avoid gumming matters for the operators. Above all, it assembles the economic and technical objectives in building links that are fully as effective in adding marginal capacity as a corresponding amount of generator capacity —and in one-fourth the time.

Ten-Cent Steak

By CARTER FIELD

This noted journalist gives his personal comments and interpretations on current happenings affecting the electrical industry. His background and his location at Washington make his thoughts informative and interesting even though all may not agree with him

EVERYTHING is relative. Even in wartime. Especially in wartime! Remember the old story about the housewife who complained to her butcher?

"The butcher around the corner only charges 40 cents a pound for steak," she grumbled. "You are charging 50 cents."

"Then why don't you buy your steaks from him?" demanded the butcher.

"He has no more steak," said the housewife.

"If I had no steak I could afford to sell it for 10 cents a pound," said the butcher.

The oil industry is planning construction of pipe lines from the Gulf region to various Atlantic Coast points. The government has been seizing its tankers; will eventually probably take them all. Government spokesmen were very patronizing. They thought the oil men should be grateful for federal assistance in surmounting local right-of-way obstacles.

"And you will be saving transportation charges on completion of the pipe lines," said the government men.

Tanker Costs Are Lowest

The oil men were indignant. They produced figures to show that the cost of transporting oil by ship was about 1 mill per ton-mile. The cost of transporting the same oil by pipe line is 2 mills per ton-mile, and then only if the line is used to capacity. If it drops to 80 per cent of capacity the cost increases to 3 mills per ton-mile, and obviously climbs higher if the percentage of capacity operation drops.

"What if you ship it in tank cars by rail?" the government spokesman asked.

The oil men threw up their hands.

"That puts it up to about 15 to 16 mills per ton-mile," one of them explained.

"What a magnificent argument for the St. Lawrence Seaway," exclaimed the government spokesman.

He was getting all ready to sell steak at 10 cents a pound!

Obviously, if the oil producers could get plenty of ships, or rather if the government were not taking all their ships away from them, they would not be enthusiastic about the pipe line.

And also, if there were plenty of ships, and plenty of crews for them, and if the St. Lawrence Seaway were in operation today, it is probable that it would be used. There are a lot of "ifs" there. For one thing the seaway is not in operation today. The earliest estimate as to its possible readiness for operation is that given by the President—four years, and he means four years after construction starts. Some experts figure eight years from the time the construction starts.

But if it were in operation now it would not be used by ocean-going ships. This is not an academic or theoretical point. It would not be used for precisely the same reason that the oil men are not being allowed to keep their tankers for use between the Gulf Coast and the Atlantic ports. Ships capable of crossing the ocean cannot be spared for that oil movement. They could not be spared for traversing the St. Lawrence Seaway, regardless of whether it might be more economical for them to do so.

Money doesn't mean much in wartime—not to governments fighting for their lives. The whole point here is that what is concerning the whole world is a scarcity of ships. The Germans are concerned with sinking every possible ship that might carry supplies to the British. The British—and the Washington Administration—are concerned with getting enough ships to keep Britain supplied despite the terrific toll of sinkings.

As long as that situation lasts, and it may well last as long as the war lasts, it would be absurd to waste the time of an ocean-going ship going way up the St. Lawrence, through a canal and through the Great Lakes, even during the warm months of the year. The same ship could make at least 50 percent more round trips to Britain in a given time by having the American terminal at Halifax. It is not a question of saving pennies in transportation cost; it is a question of rushing supplies to Britain.

Expert military opinion is that the Nazis cannot win if Britain can be kept supplied with munitions and planes and food from America, but that Britain will certainly go down if that line of supplies fails.

Perhaps the most convincing demonstration of the absurdity of the seaway as a line of supply for ships ferrying war supplies to Britain in the present emergency—and emergency here means the duration of this war—is that the British are not using Montreal as their chief port of embarkation. Montreal is not the American end of the trans-Atlantic ferry. They do not permit publication of the name of the port they are using, though it is far from being a secret, but that port which is used is a good many hundred miles east of Montreal, and that same distance closer to Britain. The whole point is to make possible more round trips a year for each ship available. The mere fact that the St. Lawrence up to Montreal is a magnificent waterway, deep and wide and permitting high speeds, is not important. Not relatively.

The Strain Is Mounting

At present more ships are being sunk every month than are being built. Some time next year the Administration hopes the rate of construction will pass the rate of sinkings. But also the Administration not only hopes but expects that the rate of production of war supplies in this country will be tremendously augmented. This means, if the hopes of the Administration are realized, that there will be a much greater strain on shipping next year than now—a greater strain in 1943 than in 1942, and a greater strain in 1944 than in 1943. Even if the utmost hopes are realized!

So far as national defense is concerned, no matter how thin you slice it, the St. Lawrence Seaway is still baloney!

NEWS OF THE WEEK

Pool Industry Resources to Avert Power Shortage

Private utility and government power officials meet at series of six conferences to meet situation caused by unprecedented drought and simultaneous rise in defense production

A co-ordinated program for pooling the electric power resources of the country to avert the power shortage occasioned by an unprecedented drought occurring simultaneously with the rapid expansion of the defense production, is being formulated at a series of conferences between utility executives and government power officials.

So serious has the problem become that plans are under way to ration electric power to industries not essential to defense production, to curtail use of power for display signs and to save electricity in homes and other places where possible.

Ration in Southeast

The drought in the Southeast has caused such a shortage of water in power reservoirs that a serious disruption of the entire electrical system of the section will occur within the next few weeks unless rain comes, Georgia Power Co. officials declared. The company disclosed that power consumption by non-defense industries will be rationed after 6 a.m. on June 16 and will be placed in effect by the TVA and Commonwealth & Southern Co. subsidiaries—Georgia Power, Alabama Power, South Carolina Power, Mississippi Power and Gulf Power companies.

J. A. Krug, chief TVA power engineer, said that a program had been worked out with municipalities and co-operatives distributing TVA power to conserve on electricity. For some time private utilities have been feeding TVA with power to meet its growing load and its falling power reserve due to low water conditions.

An appeal has gone out to all consumers to cut their use of electricity by 20 per cent. "Whiteways" have been darkened and ornamental lighting eliminated. Atlanta had a "blackout" when merchants and large consumers darkened show windows and display signs. Air-conditioning systems are not being used to save on power. A number of cotton mills have agreed to a 33⅓ percent reduction in use of power.

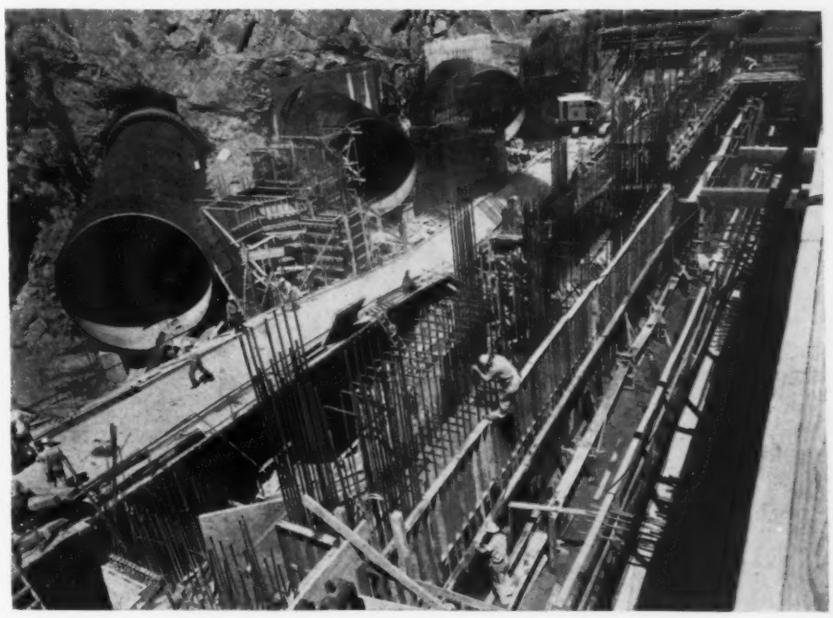
Moultrie was the first Georgia town to go on daylight saving time by proclamation of Mayor Evans Reynolds and at the same time redoubled its efforts to curtail the use of power by changing all night baseball games to late afternoon.

Rainfall in the Southeast is estimated at 50 percent below normal and reservoirs down by 60 percent at least.

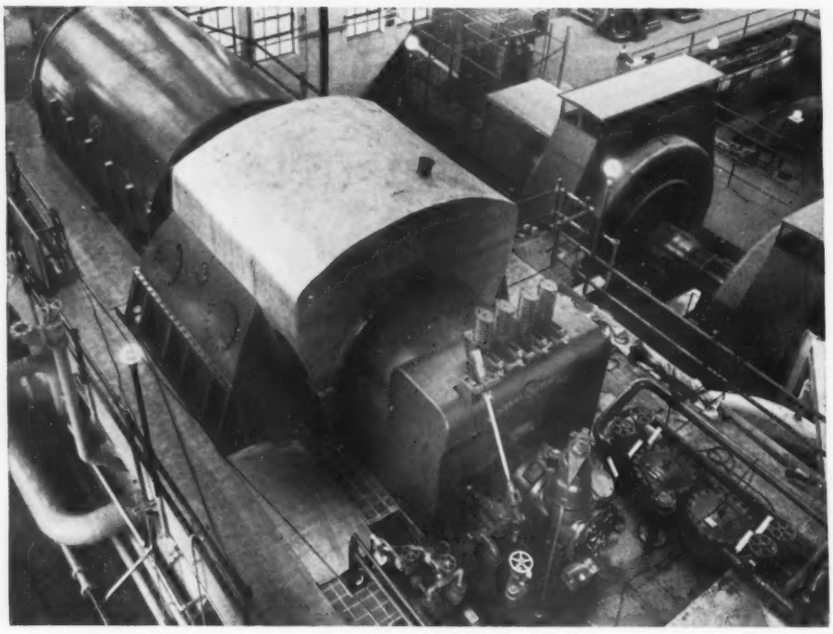
FPC Conferences

Power company officials from eight states met with Leland Olds, chairman of the Federal Power Commission, in Atlanta for the first of six regional power conferences to work on plans for a co-ordinated power pool. Many plants which have been shut down for years have been reopened to produce electricity. These include both private and municipally owned idle plants.

Mr. Olds held a conference with



POWER FOR ARIZONA—Penstocks emerge from cliff below Parker Dam on the Colorado River, where work is being rushed on a 120,000-kw. U. S. Bureau of Reclamation plant. The first 30,000-kw. unit is scheduled for operation late in 1941, with two additional units ready early in 1942. The fourth and final unit has been ordered



NEW UNIT—Narragansett Electric Company's 40,000-kw. General Electric condensing turbo-generator was recently installed at the Manchester Street station in Providence (see "Electrical World," November 19, 1938, for analysis of design problems preceding construction). It is 1,200 lb., 11 kv., 3,600 r.p.m., hydrogen-cooled

power officials in Jacksonville, Fla., to discuss plans for pooling power facilities and means of meeting the power shortage.

Last week in New York City Mr. Olds met with utility, REA, government and state regulatory officials to discuss the power situation. Major Thomas R. Tate, director of national defense power staff of FPC, presented figures developed from reports of the various utility systems and analyzed such parts of the defense program as will affect power demand in the various areas. He said that at the present time figures showed that the power defense load in the eleven states of Maine, New Hampshire, Rhode Island, Vermont, Massachusetts, Connecticut, New York, New Jersey, eastern Pennsylvania, Maryland and Delaware, and the District of Columbia, is 2,298,000 kw. with the program still expanding. Total load for the area of 11,690,000 kw. represents nearly one-third of the estimated 1941 electric power load for the country.

Government Projects

Power conferences are being held in Chicago, San Francisco, Portland, Ore., and Denver, Col.

The huge government power projects have been hard hit by the drought and have been forced to call upon private utilities for aid in meeting load. The situation has been aggravated because the government has urged large power users to locate plants near government projects to provide an outlet for the power. With a step-up in aluminum, magnesium and other defense production the drought condition has become more pronounced.

Voluntary Curtailment

Efforts are being made to bring about voluntary curtailment of non-defense power use so as to prevent rationing and other steps to conserve electricity. Utilities are speeding up construction programs to bring into operation new additions to power capacity. Several new plants are scheduled to go into operation within coming weeks. There is a possibility that the entire country will go on daylight-saving time.

Southwestern Gas & Electric Co. last week began delivery of 10,000 to 15,000 kw. of power to the TVA through Arkansas Power & Light Co. The twelve dams of TVA are dangerously low. TVA is seeking to build ten new dams in the area at a cost of $250,000,000. One TVA engineer said the problem is that "nature is guilty of refusing to cooperate with TVA."

Arkansas Power & Light officials said that plenty of power is available for use in the area and there is no need for curtailment.

Officials of utilities from ten Western states went over the situation with FPC officials. Power will be sent over interconnections where possible.

Drought conditions in the Pacific Northwest will cause curtailment of power use. Efforts are being made to speed installation of power equipment at the government projects.

New England has suffered for want of rain and power reservoirs are getting low. Steam stations have been carrying a considerable portion of the load.

Indications are that pooling of facilities and curtailment of use for non-essentials will meet the shortage of power.

•

Take Issue on Views of Kellogg on Power

Secretary Ickes took issue with Charles W. Kellogg, president of the Edison Electric Institute and OPM power expert, who declared before the Institute convention in Buffalo last week that the electric power industry had a "great basic element" of reserve power to meet defense requirements. Mr. Ickes said that Mr. Kellogg "certainly was misrepresenting the facts to the people. This is no time for any one to fool either himself or the people," he declared.

Later the OPM in a press release stated that the view expressed by Mr. Kellogg was in his individual capacity, "as it does not represent the position of the Office of Production Management." OPM stated that it is not in agreement with the views on the power subject described by Mr. Kellogg.

On the contrary, it was said, representatives of OPM have been actively engaged with other agencies of the government in developing a program to provide the additional power needed for the expanding defense requirements, particularly in the fields of aluminum and magnesium production. "It is clearly evident that without civilian curtailment in important areas," OPM said, "sufficient power will not be available in time to produce the supplies of aluminum and magnesium demanded by the growing aircraft and lend-lease program. All possible efforts are being made to expedite completion of the necessary hydro-electric and steam projects to meet the shortages that are known to be imminent."

Mr. Kellogg said that his statement before the Institute that "the power situation will be found to have been adequately provided for" was made after "careful preparation." He said that he preferred to let his speech "stand for the present."

•

Pass Utility Damage Bill

The Michigan Senate has passed and sent to the Governor for signature a House bill making malicious destruction or damage to personal property of utility companies a felony.

Roosevelt Asks Congress to Approve St. Lawrence

Message cites urgent necessity for additional power sources and transportation as national defense measure — Public hearings are scheduled for June 17 — Opposition to project grows

Seizing national defense as an excuse for construction of the St. Lawrence waterway and power project, President Roosevelt last week sent to the Congress a message asking legislation to authorize immediate development under an executive agreement of March 19 with the Canadian Government. The President said that the undertaking, which will cost the United States an estimated $285,000,000, of which New York State is to supply $93,375,000, was of vital importance to defense.

No sooner had the Administration launched its drive for Congressional approval of the agreement, rather than ratification of a treaty by two-thirds vote of the Senate—an issue which met defeat when President Roosevelt first asked approval in 1934—than opposition developed on a widening front.

President's Message

The President's message was couched in challenging terms and pictured the urgent necessity for additional sources of electric power for the United States and Canada.

"The enemies of democracy are developing hydro-electric resources on every waterway from Norway to the Dardanelles," the President said. "Are we to allow this continent to be outmatched because shortsighted interests oppose the development of one of our greatest resources?

"Your action on this project," Mr. Roosevelt wrote, "will either make available or withhold 2,200,000 hp. of low-cost electric power for the joint defense of North America. Your action on this project will either open or keep bottled up one of the greatest transportation resources ever offered a people."

Mr. Roosevelt told the Congress that "I am advised that we can build the St. Lawrence project in four years. Under emergency pressure it may be completed in less time." He cautioned that too many people have underestimated the degree to which present resources will be taxed and that "we cannot afford to make any more mistakes of that kind."

Senator H. Styles Bridges, Republican, of New Hampshire, attacked the project as a "diversion of men and materials which are needed to build planes and tanks." Representative Jesse Wolcott, Republican, of Michigan, criticized the national defense basis of the message, saying: "I think the President has gone pretty far when he claims he can justify the construction of the Great Lakes-St. Lawrence seaway from the standpoint of defense, and in the next breath admits that it cannot be completed for four years."

Because feeling in Washington is that the measure will be defeated and proponents are openly not optimistic, the bill is certain to become a first-class "trading post." Already proponents are suggesting trades of votes for other sectional bills in return for support of St. Lawrence.

Public hearings will start before the House committee on June 17, with no present indication of how long they will last. The measure was introduced by Chairman Mansfield of the rivers and harbors committee. The bill directs that the project be started at once and authorizes the letting of non-advertised negotiated cost-plus-fixed-fee contracts to speed the work.

•

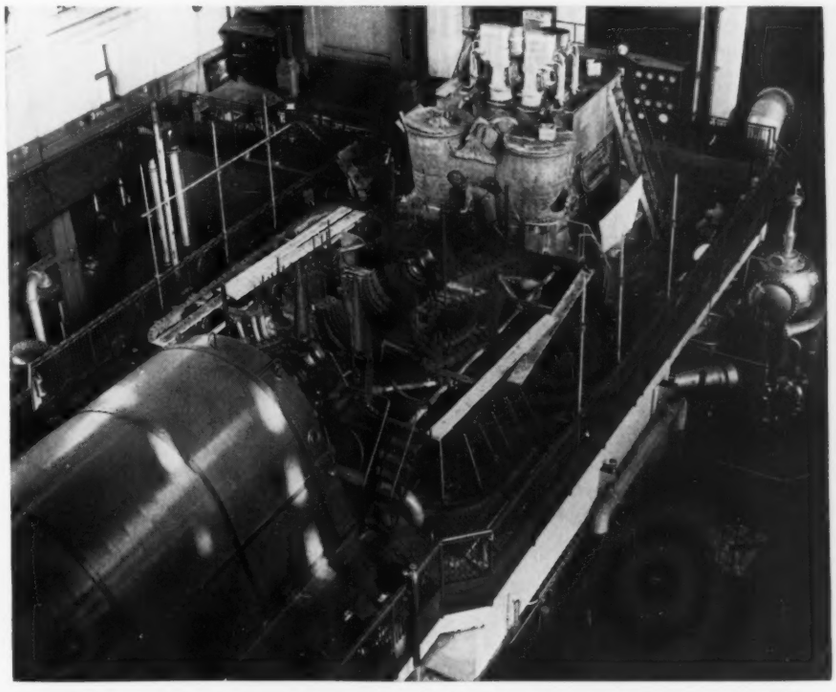
Ohio Edison Starts Work on New Plant

Ground for the new $3,600,000 addition to the Gorge power station on the Cuyahoga River in North Akron was broken last Saturday by A. C. Blinn, president of Ohio Edison Co., in brief ceremonies launching a move to add 40,000 kw. to Akron's power supply.

Contract calls for completion of the work by January 1, 1942.

Contrary to conditions in some parts of the country, Mr. Blinn said, there has been "no shortage of power or curtailment of service anywhere on the Ohio Edison system and the company does not expect any."

Mr. Blinn pointed out that "our present generating facilities are more than sufficient to take care of current requirements everywhere on our system and the construction of this new plant is proof of our determination to keep well ahead of any demands that may be made upon us as the defense program progresses."



OVERHAUL—Operating men of Philadelphia Electric Co. overhauled the 165,000-kw. Westinghouse turbo-generator at the Richmond station. The rotor of this world's largest single-shaft turbo-generator was removed and the blades retipped. Only two blades had to be replaced. Since its installation March 6, 1936, the unit has produced more than 4½-billion kilowatt-hours in the five years. During 1940 it produced 1,006,000,000 kw.-hr. It consumes about 6,300 carloads of coal a year

NEWS BRIEFS

CAPACITORS have not found widespread application to Central and South American systems partly because peak loads there come at night, and are due to lighting loads, with 90 to 93 percent power factors.

MODERNIZATION of the street lighting system in the downtown business area of Bridgeport, Conn., by United Illuminating Co. is practically completed.

LEGISLATION establishing federal licensing of stationary power engineers and boiler operators in all plants generating electric, steam or other power used in interstate commerce or for uses designated by the Secretaries of War or Navy as necessary to national defense, has been introduced in the Senate by Senator Langer of North Dakota. A federal three-member board of examiners would be established.

PLANS ARE UNDER WAY to split Louisville Gas & Electric into two companies to be locally controlled if as and when SEC orders sale of the Standard Gas & Electric properties.

EMPLOYEES OF Edison Light & Power Co. and its subsidiaries presented Joseph E. Wayne, president and general manager, with a huge bouquet of roses in recognition of his 35th anniversary of affiliation with the local utilities. It was on May 18, 1906 that Mr. Wayne began in the new business department of the company.

THE 18-YEAR-OLD EMPLOYEES savings plan has been suspended by General Electric and a defense savings plan to encourage its 105,000 employees to purchase U. S. Savings Bonds has been substituted. Deductions are made by the company from earnings on installment payment basis.

IN ORDER TO STIMULATE INTEREST in electric ranges, refrigerators and water heaters, the Electrical Association of Philadelphia is conducting a campaign in Philadelphia, Bucks, Chester, Delaware and Montgomery counties. Two shows and a special newspaper advertising activity boosts the drive.

AT THE END OF APRIL the average annual residential use of electricity in Chattanooga, Tenn., was 2,055 kw.-hrs. and the rate was 1.74 cents. Electric appliance sales in April reached the all-time high of $384,026.

FOR THE FIRST TIME in its history, I.E.S. will hold its convention in the "deep South" with the 35th annual meeting to be held in Atlanta, Ga., September 23-25. President A. D. Cameron says "this convention will be distinctly a working occasion."

A SIGNAL HONOR was recently conferred on the Rocky Mountain Electrical League when George E. Lewis, manager, received the American Trade Association's 1940 award of merit.

•

Utilities Act to Avert Threatened Strikes

Strikes in defense and other industries have spread to threatened action in the utility industry. J. Russell Sprague, Nassau County executive, intervened this week in an attempt to avert a strike of power employees of Long Island Lighting Co., New York. Mr. Sprague exhorted company and A.F.L. union officials to continue negotiations to forestall any action that might disrupt electric service.

In Pittsburgh members of the CIO union voted to strike at the Colfax plant of Duquesne Light Co. However, the strike threat was offset by announcement by George Mueller, president of an independent union which holds a system-wide contract with the company, that members of his group will man the plant to insure continuation of service.

The threatened gas strike against Cincinnati Gas & Electric Co. and subsidiaries was forestalled last Saturday by the signing of an agreement between the company and the United Mine Workers of America, CIO. The agreement called for wage increases, time and one-half for overtime, double time for Sundays and holidays, paid vacations and paid sick leaves.

•

P.G.&E. Hydro License Reaffirmed by FPC

Last week the FPC reaffirmed its authorization of a license to the Pacific Gas & Electric Co. for construction of the $19,000,000 Cresta and Pulga power plants on the Feather River in California, but declined to extend the life of the license from 35 to 50 years.

The petition was dismissed once by the commission, but in reversing itself the FPC said its recent power survey indicated construction by the company, as well as completion of the government-owned Central Valley project in California, including the Antioch steam plant, was needed now to meet defense requirements.

The 68,000-kw. Pulga and the 80,000-kw. Cresta are two of a series of hydroelectric plants which the utility will build on the north fork of the Feather River between its Caribou and Big Bend power plants, already operating.

New York Utility Body Votes to Dissolve

After 36 years as a trade association for the electric and gas utility industry in New York State, the Empire State Gas and Electric Association has been dissolved as of May 31. The agreement reached by the 31 companies, as members of the association, was reached after careful consideration of the problem raised by the Securities and Exchange Commission that all service organizations are subect to Section 13 of the public utility holding company act. The association was formed in 1905.

Officers of the association included Irving K. Peck, president of Binghamton Gas Works, president; John L. Haley, president of Central New York Power Corp., vice-president; Herbert C. Davidson, vice-president of Consolidated Edison Co., treasurer, and George H. Smith, secretary. Mr. Smith has served fifteen years with the association and has been secretary since 1936.

Mr. Smith has been named trustee to wind up the affairs of the association.

•

Rankin Would Change Terms of REA Loans

Congressman Rankin, leader of the public power cult in Congress, wants to lighten the terms on which Rural Electrification Administration loans money for farm power lines. He has introduced a bill which authorizes REA to make loans up to a 50-year maturity, double the present period.

The bill also would provide for reduction in prevailing interest rates by making REA interest rates equal to the average interest on all government obligations floated in the previous year, rather than equal to the interest rate on all long-term government bonds.

Another section raises the annual REA loan authorization to $100,000,000. This is the amount given the agency for the last two years, although the statutory loan authority is $40,000,000.

•

Utility Counsel Doubts SEC Power on Payments

The SEC was told this week by James L. Boone, an attorney for Electric Bond & Share Co., that it had "no power to promulgate" a proposed rule which would prohibit payment of interest on debt to parents by holding company subsidiaries whose publicly held preferred stock is in arrears on dividends, except with SEC approval.

Mr. Boone described the proposed action as a "reshuffling of priorities or

position" and added that while it was intended to help the stockholders of some companies it made no provision for the public holders of preferred stock of the parent organization. He contended that the rule seeks to extend the principles of bankruptcy and reorganization law to solvent going concerns.

•

Blackout in Suffolk

Suffolk County (Long Island) Defense Council has set July 15 for the first county-wide blackout in a civil defense experiment, which will cover an area of approximately 920 square miles. The blackout will be held between 9 and 10 p. m. and will be of twenty minutes duration.

•

Lighting Directors Hold Sessions at Nela Park

More than 230 utility lighting executives from all parts of the country and Nela Park engineers joined in the two-day annual conference of utility lighting directors held at the General Electric Institute. A special dinner honored 49'-ers old and new.

Discussions during the two-day parley revolved around ways and means for providing the best light for national defense work and associated industry. S. M. Crocker, vice-president of General Electric, was chief speaker at the 49'-er banquet and gave an informal talk on the role of the electrical industry in the current war effort.

South American Utilities to Add Plant Capacity

Subsidiaries of American & Foreign Power to spend $12,000,000 on new plants and additions — Budget up $5,000,000 over last year — Widespread gains reported for last year

Construction program for 1941 of American & Foreign Power Company, Inc., will approximate $12,000,000, as compared with average annual expenditures of about $7,000,000 for the past several years, according to C. E. Calder, president. Last year construction expenditures totaled $7,624,835, all financed with funds from earnings. An estimated $3,100,000 of the construction increase over previous years is accounted for by two contracts with governmental authorities in Colombia and Costa Rica.

Plant Additions

Several power plants and additions are under construction at the present time, the principal ones being 15,000 kw. in the state of Sao Paulo; 6,000 kw. in the city of Porto Alegre, Brazil; the 12,000-kw. Volcan hydro-electric installation in Chile; 5,650 kw. in Colombia; 2,500 kw. in Costa Rica, and 4,920 kw. in Argentina. In addition, it is expected that the 15,000-kw. high-pressure unit in Shanghai will be completed next fall. Construction was started on this unit in 1937 but suspended by the Sino-Japanese conflict.

Plant capacity showed a net increase of 2,589 kw. in 1940. This included additions by subsidiaries in Mar del Plata, Argentina; Bahia, Brazil; Barranquilla, Colombia; Panama City and Colon, Panama, and various other localities.

At the end of 1940 the thirteen subsidiaries of American & Foreign Power were serving a total of 1,383,735 customers with electricity in 1,023 communities in nine Central and South American countries, Mexico, Cuba, China and India, an increase of approximately 5.5 percent in customers over 1939. Installed generating capacity was 1,017,114 kw. and output totaled 3,527,400,000 kw.-hr., increases of 0.3 percent and 2.7 percent in capacity and output, respectively. Operating revenues for electric power and light, accounting for 85 percent of the total, were $52,196,801 in 1940, compared with $49,519,064 in 1939.

Aside from the Shanghai unit, no real difficulties have been experienced with deliveries, according to Mr. Calder. In general, expenditures will not be made this year where exchange is blocked, unless exchange permits are granted for necessary foreign equipment purchases.

LIGHTING MEETING—L. E. Fenlon of Des Moines Electric Co. (left) and G.E's. C. E. Weitz (under hat) frisk two prospectors for 49'er applications. The "victims" are L. W. Byrne of Nebraska Power and C. R. Tracy of Sioux City Gas & Electric

•

Utility Seeks to Extend Natural Gas Service

Michigan Public Service Commission started hearings on June 10 on application of the Consumers Power Co., a subsidiary of Commonwealth & Southern Corp., and the Panhandle Eastern Pipe Line Co. to bring Texas natural gas to Flint and 65 other Michigan communities in the territory served by Consumers Power.

Consumers has contracted with Panhandle Eastern for sufficient natural gas to meet the needs of nearly all the communities that Consumers now supplies with manufactured gas. The project will require an expenditure by Panhandle of about $9,000,000 and about $2,000,000 by Consumers.

•

Confirms FPC Appointment

The Senate has confirmed the nomination of Claude L. Draper for a new term as a member of the Federal Power Commission.

Maine REA Measure Opposed by Utilities

Challenging statements that Maine is backward in rural electrification, President Walter S. Wyman of the Central Maine Power Co. appeared before a legislative committee in Augusta in opposition to a bill carrying sweeping powers for rural co-operatives, which, it is asserted, seek to do a public utility business without responsibility, with unrestricted territory and without control.

Mr. Wyman described the measure as a "wolf in sheep's clothing" and said it threatened destruction to existing utilities in the state. He said that "when 14,000 Maine people put $15,000,000 of their own money into (utilities) something to serve themselves, it comes pretty close to being a co-operative movement."

Referring to the late Samuel Insull, who was attacked at the hearing by advocates of the bill, Mr. Wyman pointed out that Mr. Insull put somethink like fifteen times the money into Maine that he took out; that he saved five large cotton mills employing hundreds of people from being junked, and declared that it would be good for the state if Mr. Insull were alive and could be "turned loose" in the territory again.

Edward F. Merrill, counsel for the company, stated that this utility and the Cumberland County company of Portland serve 64 per cent of the farm homes in their areas. He opposed the bill on many grounds, asserting that it would give any five people anywhere, without investing scarcely any of their own money, the right to form their own company and take by eminent domain any property without authority of the state to control their actions. R. N. Haskell, vice-president Bangor Hydro-Electric Corp., also opposed the bill.

•

Orders 30,000-Kw. Unit

A second 30,000-kw. generating unit has been ordered by Arkansas Power & Light Co. for probable installation in the new station to be constructed in the sour gas fields of southwest Arkansas. The first 30,000-kw. unit has been ordered and delivery has been promised within 20 months. It has not been decided whether the second unit will be installed in the same plant or whether a new location will be chosen.

•

Asks $40,000,000 for TVA

President Roosevelt has asked Congress for an additional $40,000,000 to enable the TVA to install new generating facilities to meet demands of armament industries. It is proposed to begin construction of two additional hydro projects and two additional storage projects, install additional generating units in existing projects and to build additional transmission facilities.

•

Considering Exchange

At the annual meeting of stockholders of the National Power & Light Co. held recently, P. B. Sawyer, president, revealed that the company is discussing with SEC a plan providing for exchange of its holdings of Houston Lighting & Power Co. common stock for its outstanding preferred shares.

•

Extensions Get Under Way

Work has been started by the Pacific Power & Light Co. on its Hermiston district facilities, according to John A. Clarke, local manager. New lines will supply 83 homes and some 6,700 ft. of new lines will be built. This is the third major addition to the electrical service in this area, which was formerly served by Hermiston Light & Power Co.

MEETINGS

American Society of Heating and Ventilating Engineers—Semi-annual meeting, Palace Hotel, San Francisco, Calif., June 16-19. A. V. Hutchinson, secretary, 51 Madison Av., New York, N. Y.

American Institute of Electrical Engineers—Summer meeting, Royal York Hotel, Toronto, Canada, June 16-20; Pacific Coast convention, Yellowstone National Park, August 27-29. H. H. Henline, national secretary, 29 West 39th St., New York, N. Y.

Pacific Heating and Air Conditioning Exposition—Exposition Auditorium, San Francisco, Calif., June 16-20. Publicity Department, Pacific Heating & Air Conditioning Exposition, Grand Central Palace, New York, N. Y.

American Society of Mechanical Engineers—Semi-annual meeting, Kansas City, Mo., June 16-20. C. E. Davies, national secretary, 29 West 39th St., New York, N. Y.

American Society for Testing Materials—Annual meeting, Palmer House, Chicago, Ill., June 23-27. R. E. Hess, assistant secretary, 260 South Broad St., Philadelphia, Pa.

Society for Promotion of Engineering Education—Annual meeting, Rackham Building, Ann Arbor, Mich., June 23-27.

Canadian Electrical Association—Annual meeting, Seigniory Club, P. Q., Canada, June 25-27. B. C. Fairchild, secretary, 804 Tramway Bldg., Montreal.

Michigan Electric Light Association—Annual convention, Grand Hotel, Mackinac Island, Mich., June 30-July 2. C. H. Silvester, secretary, Port Huron, Mich.

International Association of Electrical Inspectors—Southwestern section, Hotel DeAnza, San Jose, Calif., August 25-27. H. L. Gerber, secretary, Room 205, City Hall, San Francisco, Calif.; northwestern section, Winthrop Hotel, Tacoma, Wash., September 2-5. F. D. Weber, secretary, P. O. Box 70, Portland, Ore.; western section, Hotel St. Paul, St. Paul, Minn., September 8-10. F. H. Moore, secretary, 320 N. Meridian St., Indianapolis, Ind.; eastern section, Mayflower Hotel, Washington, D. C., September 22-24. F. N. M. Squires, secretary, 85 John St., New York, N. Y.; southern section, McAllister Hotel, Miami, Fla., September 29-October 1. Joseph Whitner, secretary, P. O. Box 1743, Atlanta, Ga.

Allot Fund for New REA Power System

Announcement has been made by the Rural Electrification Administration that the President has allotted, through REA, $200,000 to permit construction to start on a co-operative transmission system to carry power from the Pensacola Dam to REA distribution co-operatives in four states. The announcement stated that the new lines are necessary to provide power to develop zinc deposits, badly needed in national defense. An Army camp may also be a major consumer.

This allotment is made to the K.A.M.O. Electric Co-operative with headquarters at Vinita, Okla. It is the second partial allotment for the co-operative transmission system. An REA allotment of $58,000 last month permitted engineering work to proceed, but exhausted available REA loan funds. It will make low cost power from the Pensacola Dam across the Grand River available to fifteen member REA distribution co-operatives located in Kansas, Arkansas, Missouri and Oklahoma.

•

SEC Members Confirmed

The Senate has confirmed the nomination of Ganson Purcell to be a member of the Securities and Exchange Commission. It has also approved the reappointment of Commissioner Robert E. Healy for a third term on the commission.

•

Co-op Must Get License

Federal Power Commission has found that a license under the Federal Power Act will be required for a hydro-electric project proposed to be constructed by the First Iowa Hydro-Electric Co-operative of Muscatine, Iowa, on the Cedar River near Moscow, in Muscatine and Cedar counties, Iowa. The project would include a power house on the west bank of the Mississippi at Muscatine, having an initial installation of 50,000 kw.

•

Builds 11,000-Volt Line

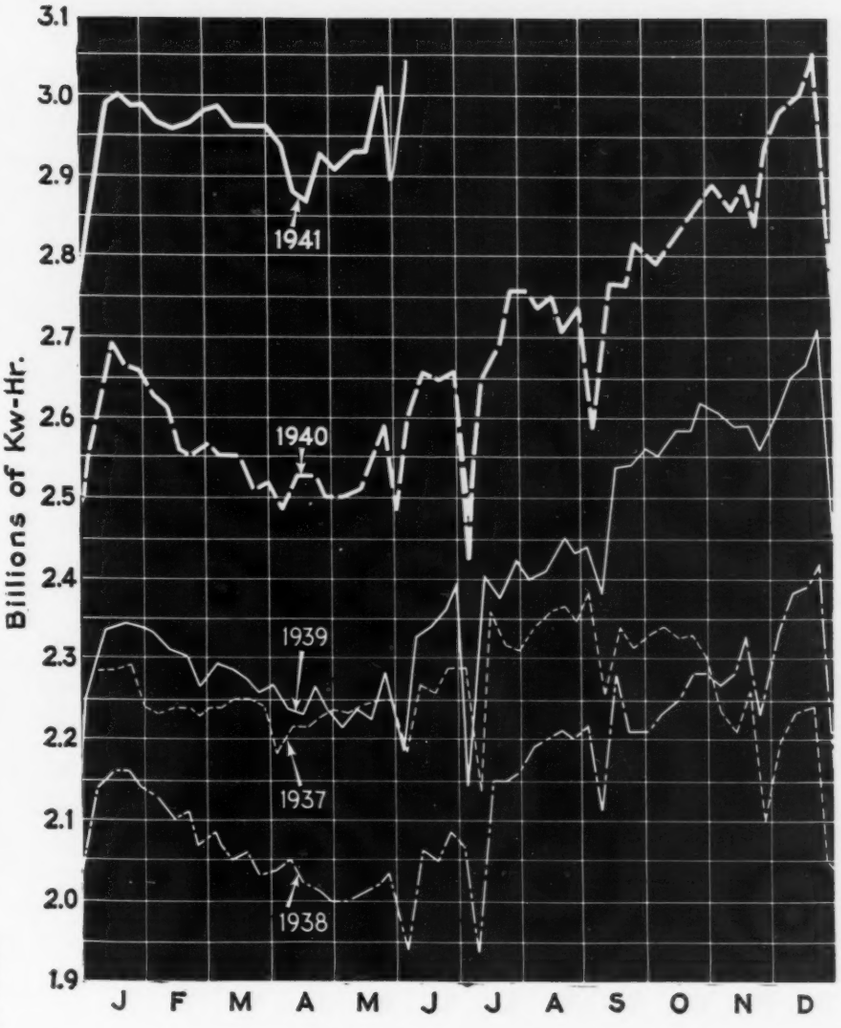
Wisconsin Power & Light Co. is constructing a new 11,000-volt line into Rudolph, replacing the 6,900-volt line which has served the community in the past. The company has built about 12 miles of rural lines this spring to serve farmers in Wood and Marathon counties.

Energy Output Rises 4% Over Week Ago

Electrical energy production for the week ended June 7 totaled 3,042,128,000 kw.-hr., as against 2,598,812,000 kw.-hr. in the corresponding week last year, according to report of the Edison Electric Institute. This represents an increase of 17.1 percent over a year ago. On the basis of the old series the figure for the current week was 2,876,872,000 kw.-hr.

Output for the week ended May 31 was 2,924,460,000 kw.-hr., as against the preliminary estimate of 2,898,000,000 kw.-hr. by the Institute as reported last week.

Output rose 4.01 percent over the preceding week, with substantial gains reported in most regions over a year ago. The smaller gains reported in some regions was partly due to strikes and to the curtailment of use of electricity to meet the shortage of power due to drought conditions. Until heavy rains, this curtailment is likely to become more pronounced.



Weekly Output, Millions Kw.-Hr.

1941		1940		1939	
June 7	3,042	June 8	2,599	June 10	2,329
May 31	2,924*	June 1	2,478	June 3	2,186
May 24	3,012	May 25	2,589	May 27	2,278
May 17	2,983	May 18	2,550	May 20	2,235
May 10	2,975	May 11	2,516	May 13	2,239
May 3	2,915	May 4	2,504	May 6	2,225
Apr. 26	2,926	Apr. 27	2,499	Apr. 29	2,244
Apr. 19	2,874	Apr. 20	2,529	Apr. 22	2,265
Apr. 12	2,882	Apr. 13	2,530	Apr. 15	2,235
Apr. 5	2,938	Apr. 6	2,494	Apr. 8	2,244

Per Cent Change from Previous Week

	Week Ending		
	June 7	May 31	May 24
New England	+25.1	+21.5	+21.0
Mid-Atlantic	+19.2	+15.0	+13.7
Central Industrial	+22.2	+21.4	+21.3
West Central	+11.5	+18.7	+ 8.4
Southern States	+15.8	+22.4	+19.9
Rocky Mountain	+12.3	+14.7	+15.8
Pacific Coast	+ 4.2	+ 6.9	+ 4.9
Total United States	+17.1	+18.0*	+16.3

* Revised.

April Power Output 15% Over Year Ago

Total production of electric energy for public use during April was 12,668,716,000 kw.-hr., of which 4,806,287,000 kw.-hr., or 38 percent, was produced by water power, according to report of the Federal Power Commission.

The average daily production was 422,291,000 kw.-hr., which is a decrease of 0.1 percent when compared with March, but an increase of 15 percent over a year ago.

Reports received during April indicated that the capacity of generating plants in service at the end of the month totaled 42,041,502 kw. This is a net increase of 129,472 kw. over that previously reported in service at the end of March.

Total stock of coal on hand at electric utility power plants on May 1 was 10,204,215 tons, a decrease of 18.7 percent from the preceding month and a decrease of 2.8 percent as compared with a year ago. It is calculated that coal stocks on hand are sufficient to last 65 days for bituminous coal and to last 179 days for anthracite.

•

Plan Forum on Vision in Defense Industry

The relation of efficient vision and adequate lighting to safety and production efficiency in defense industry will be discussed in a special forum featuring the final educational session of the 44th annual congress of the American Optometric Association in Atlantic City, N. J., July 3.

Illuminating engineers who will speak at this forum, believed to be the first of its kind, will include Samuel G. Hibben of Westinghouse, H. L. Logan of Holophane and Dr. Matthew Luckiesh and Frank K. Moss, both of General Electric.

Output Hits New High

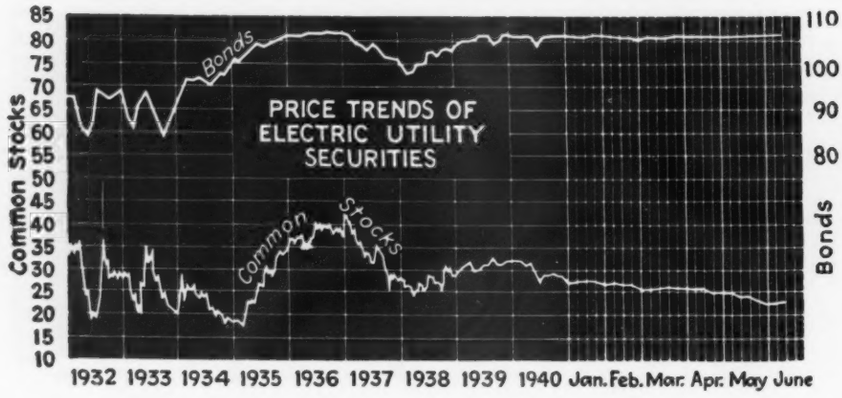
Output of central electric stations in April in Canada totaled 2,693,353,000 kw.-hr., a new high record, compared with 2,631,809,000 in March and 2,398,722,000 in April, 1940. Exports to the United States were 211,594,000 kw.-hr., compared with 201,613,000 kw.-hr. the previous month and 170,600,000 kw.-hr. a year ago.

•

Primary Load Up 7.9%

Hydro-Electric Power Commission of Ontario reports primary load for all systems in April at 1,732,662 hp., compared with 1,605,165 hp. in April last year, an increase of 7.9 per cent. Primary and secondary loads for all systems totaled 2,041,998 hp., against 1,954,414 hp. in April, 1940, an increase of 4.5 per cent.

Light and Power Security Prices Rise


PRICE TRENDS OF ELECTRIC UTILITY SECURITIES
Bonds
Common Stocks
Common Stocks
Bonds
85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10
110 100 90 80
1932 1933 1934 1935 1936 1937 1938 1939 1940 Jan. Feb. Mar. Apr. May June

Following the general market trend, utility securities recovered during the past week. "Electrical World" stock index advanced to 23.6, the highest point since mid-May; 23.1 last week, 26.0 last year. Bonds, 105.8; last week, 105.7; last year, 103.4

SEC Counsel Urges Utility Revamping

Maurice Forer, attorney for the Securities and Exchange Commission, has urged the commission to reject the pending plan of Virginia Public Service Co. to refinance outstanding debt and to provide funds for new construction.

He described the plan as "half-baked" and recommended that the SEC immediately force a "complete recapitalization of the Virginia company, which is a subsidiary in The Associated Gas & Electric System.

Chief officers of the company and Willard L. Thorp, trustee for Associated Gas & Electric Corp., on the other hand urged approval of the refinancing plan as part of a general program to financially rehabilitate the Virginia company and make possible its disposal by Associated under the Utility Act "death sentence."

•

Southwestern Utility Plans New Bond Issues

General Public Utilities, Inc., Newark, N. J., and its subsidiary, the Southwestern Public Service Co., Amarillo, Tex., have asked the Securities and Exchange Commission to approve sale by the subsidiary of $3,421,000 of 3¾ per cent first mortgage sinking funds, series A, due in 1966, to the Equitable Life Assurance Society at 105½ and accrued interest. Proceeds would be used to redeem $4,321,000 of 6 per cent first mortgage bonds.

Southwestern proposes to issue also $1,331,000 of 4 per cent first mortgage sinking fund bonds, series B, due in 1971, to its parent in exchange for a like amount of 6 per cent first mortgage bonds, and also to issue to the parent $1,162,000 of 5 per cent unsecured notes due in 1972 in exchange for $870,000 of 7 per cent unsecured notes and $292,000 of 6 per cent demand notes.

SEC has authorized the issue.

•

SEC Asks for Writ in Utility Dispute

A Federal District Court injunction was asked by the Securities and Exchange Commission last week to forestall a proposed dissolution of an intermediate holding company by the North American Co., but Judge John P. Nields set June 27 for argument and, with counsel for SEC and North American in agreement, directed that a stockholders' meeting scheduled for June 4 be delayed until June 30.

The North American Co. had planned to dissolve North American Light & Power Co. The commission informed the court that dissolution of the subsidiary would hamper the commission's program for integration of utilities.

Edward L. Shea, president of the North American Co., issued the following statement:

Throughout the course of our relations with the Securities and Exchange Commission in its administration of the Public Utility Holding Company Act, our attitude has been to seek a constructive solution of each problem as it has arisen. The appearance of the North American Co. and its subsidiary, North American Light & Power Co. . . . in the Federal District Court . . . was made in no spirit of defiance and with no feeling of antagonism toward the Securities and Exchange Commission. Moreover, we have no desire to obstruct the work of the commission or thwart it in any of its functions. . . . The issue on which the SEC and we find ourselves in court is whether the SEC has jurisdiction to prohibit the voluntary dissolution of North American Light & Power Co., a registered holding company, under the laws of the state of its incorporation. . . . Our purpose is simply to protect, as far as we are able, the legitimate interests and equities of our 74,000 stockholders, who are in effect the majority stockholders of North American Light & Power Company, while at the same time we respect the legitimate interests and equities of the minority stockholders of the latter company."

•

SEC Permits Bond Issue, First for Open Bids

Securities and Exchange Commission, in granting permission to the New York State Electric & Gas Corp. to sell $35,393,000 of first mortgage bonds and 120,000 shares of cumulative preferred stock to implement a redemption operation, approved the first issue of securities under its new rule requiring competitive bidding.

The federal agency gave consent on condition that the utility obtain from the New York Public Service Commission a final order approving issuance and sale of the securities and that it report results of the competitive bidding to the SEC.

•

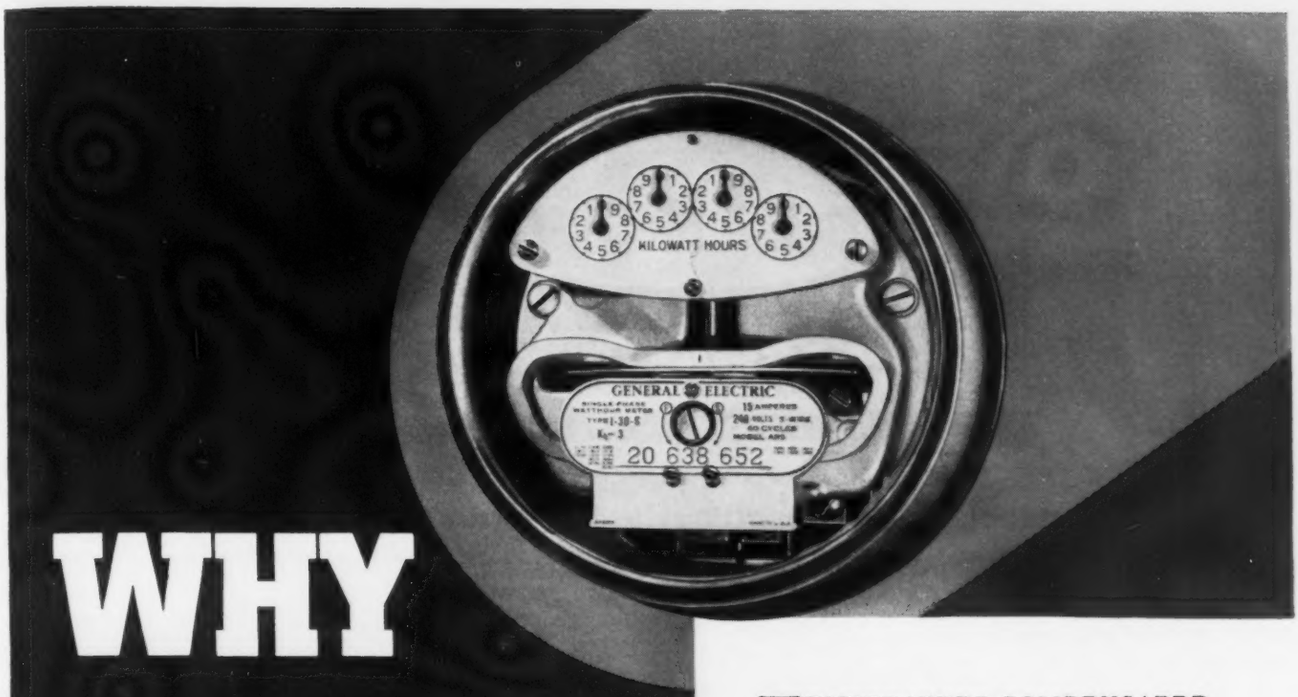
Associated Petition Hit

Petition filed by Jack L. Kraus, setting forth claims of some $200,000,000 for holders of fixed-interest obligations of the Associated Gas & Electric system, was characterized as "repetitious" in an answer filed by the trustees of the Associated Gas & Electric Corp. Suggesting that Federal Judge Vincent L. Leibell hold a conference for the purpose of "simplifying the issues" involved, the trustees, Denis J. Driscoll and Willard L. Thorp, remarked that every effort already was being made to effect a speedy and fair reorganization.

Utility Reports

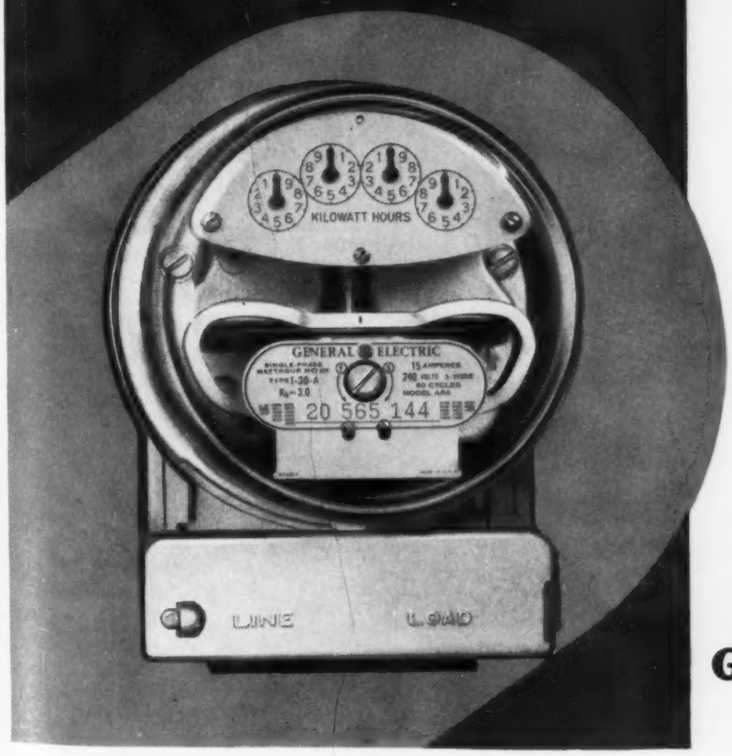
	Net Income 1941	1940
*American Power & Light and subs.	$11,298,367	$12,098,190
*Central Arizona Lt. & Pwr.	800,573	857,317
*Dallas Power & Light	2,166,594	1,618,064
*Florida Power & Light	2,853,925	2,061,186
*Houston Ltg. & Power	2,978,173	2,703,779
*Kansas City Pwr. & Lt.	3,673,264	3,866,254
*Minnesota Power & Light	1,441,254	1,363,672
*Montana Power and subs.	3,795,085	3,646,854
*Pacific Power & Light and sub.	924,874	880,945
*Public Service Corp. (N. J.) and subs.	23,618,275	25,561,308
†San Diego Gas & Elec.	2,188,374	1,453,530
*Texas Electric Service	1,240,706	1,540,306
*Utah Power & Light and subs.	1,964,047	1,519,841
†Wisconsin Pub. Serv. and sub.	1,832,152	1,716,832

*Twelve months ended April 30.
†Twelve months ended March 31.



WHY Low-resistance Potential Coils?

(CLASS II TEMPERATURE COMPENSATION)



TEMPERATURE-COMPENSATED damping magnets assure constant damping flux, and are unaffected by normal temperature changes. This constitutes Class I temperature compensation that is associated with unity-power-factor loads.

However, at other than unity-power-factor loads, variations in resistance of the potential coil, due to changes in ambient temperatures, adversely affect the characteristics of the meter and cause what are designated as Class II temperature errors. While this may necessitate some compensation of the lag adjustment, such as a temperature-sensitive lag plate as in the I-30 meter, a low-resistance potential coil lessens its need. Better temperature performance is an inherent characteristic of such a coil, and the small amount of compensation required makes it possible to obtain more uniform results in the operation of the meter.

Low-resistance potential coils have characterized General Electric watthour meters for almost three decades and are a fundamental feature of the I-30 line. General Electric, Schenectady, New York.

GENERAL ELECTRIC

601-8-6110

OPERATING PRACTICES

By-Pass Disconnects for Meter Isolation

Extension of the use of by-pass disconnect switches employed for taking regulators out of service to isolating metering equipment is reported as a successful operation by a West Coast utility. In this adaptation the switches enable replacement of damaged metering equipment without interruption of the load and by-passing is accomplished in one operation.

In addition to their application to four-wire wye and three-wire delta installations, as indicated by the accompanying diagrams, the equipment has also been adapted to such temporary installations as large construction projects. In one such instance previous practice called for mounting metering equipment on one pole and facilities for testing this equipment on a second pole.

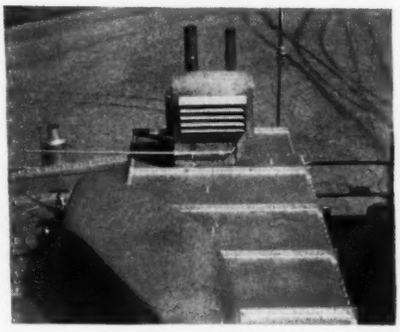
With this installation it was necessary to bring the testing instruments to the platform, connect to fuse disconnects on the crossarms, close the fuse disconnects and open the gang-operated disconnects atop the pole before the test could be conducted. If replacements were necessary the current and potential transformers were difficult to remove from the line without dropping the load; working with the line energized added a hazard to the lineman's job.

As redesigned, the pole top switch and the six fuse disconnects, along with the second pole, were eliminated and replaced with two by-pass switches and one hook-operated disconnect which are mounted on the same pole as the transformers.

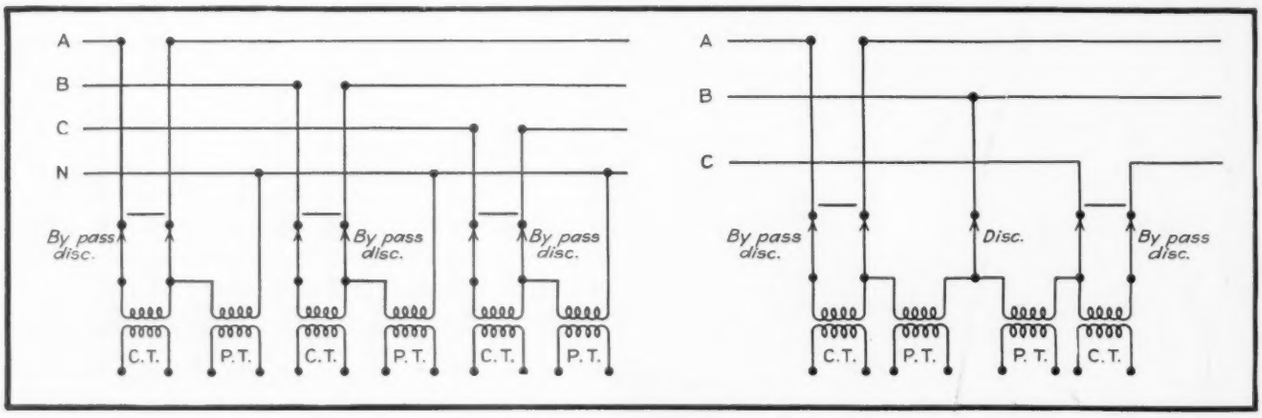
The new construction provides facilities for testing, replacing and servicing metering equipment without danger to the lineman or possibility of dropping the load. In addition, it has made possible a substantial saving in material cost and switching equipment. Compactness and neatness also features the installations.

On all of these installations Kearney open-type by-pass disconnecting switches were used.

Metal Housing for Safety Valve



During the early history of the outdoor boilers at a Southern steam-electric station considerable trouble was experienced with the "popping" of safety valves. A driving rain, and in some instances a high wind from a certain quarter, cooled one side of the valve more than the other, warped the seat and caused operation. The accompanying illustration shows the sheet metal housing that was built around the valve, which proved to be



ON FOUR-WIRE wye metering transformer installation (left) the by-pass disconnect switches are connected as shown, metering current and potential transformers being connected to the lower terminals of the switches. Note that with some two-element polyphase watt-hour meters only two potential transformers are required. On three-wire delta metering transformer installation (right) two by-pass disconnects and one hook-operated disconnect take the place of seven hook-operated switches

NOW shipped in 4 weeks

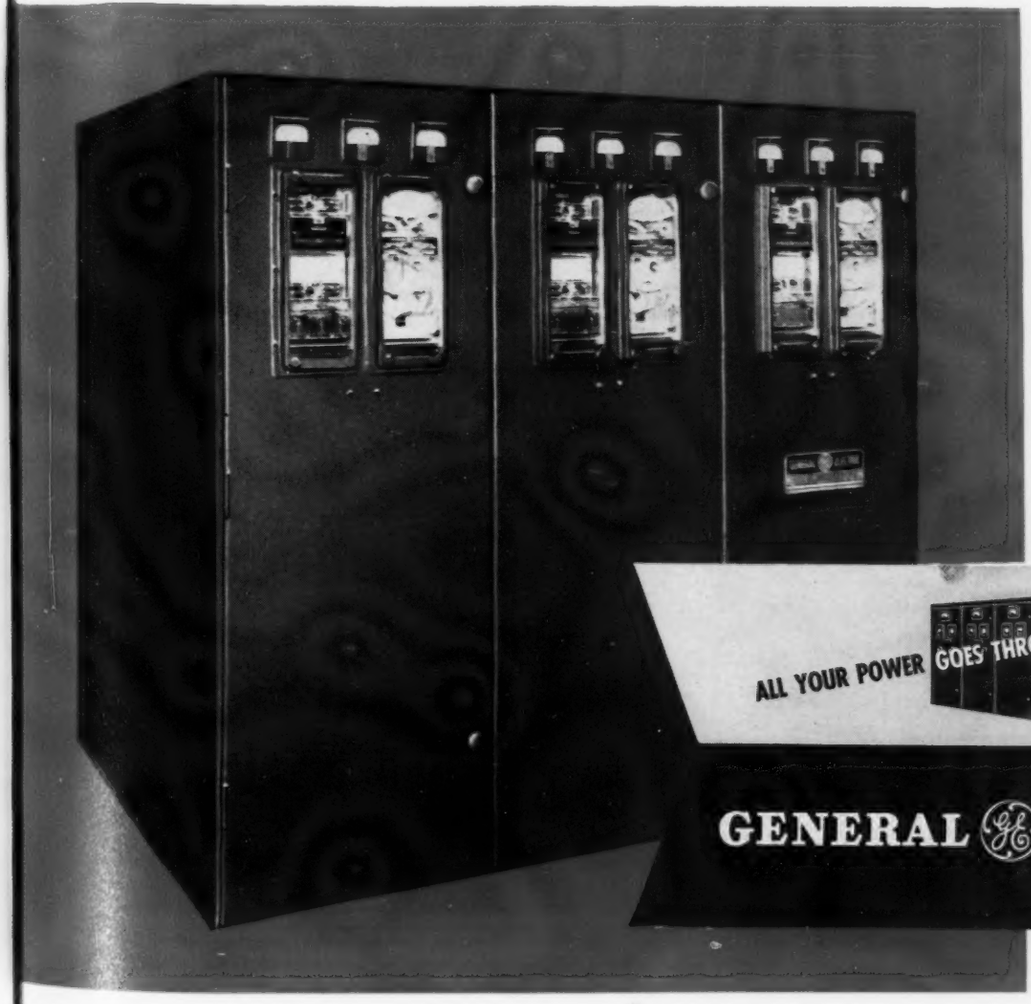
(INSTEAD OF SEVERAL MONTHS)

THIS reduction in shipping time for low-capacity Type MI-9 metal-clad was made possible by standardizing units that *adequately* meet industry's requirements for incoming lines and feeder circuits (up to 2300 volts).

This is a real contribution of our Switchgear Division to the defense production lines of America. Last year their contribution was a 25 per cent reduction in the price of these small and medium-sized metal-clad units.

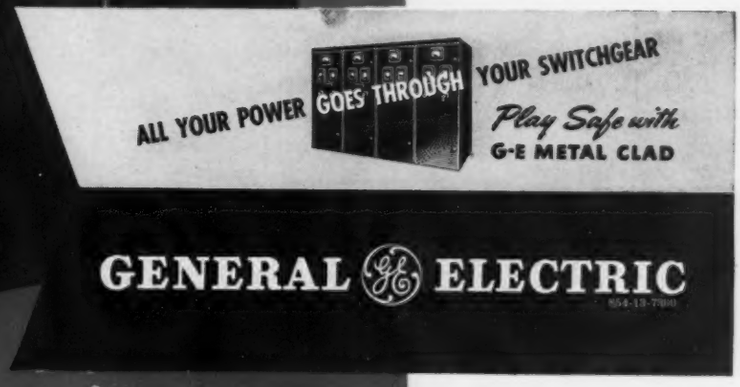
Now you can get the finest switchgear built—completely factory-assembled—all ready to be bolted down and have the cables connected, utterly safe and dependable, at bed-rock prices because of standardization, and all this in new record-breaking time.

All your power goes through your switchgear. Haven't you some obsolete gear that should be replaced today? Talk to your G-E salesman. General Electric, Schenectady, N. Y.



3

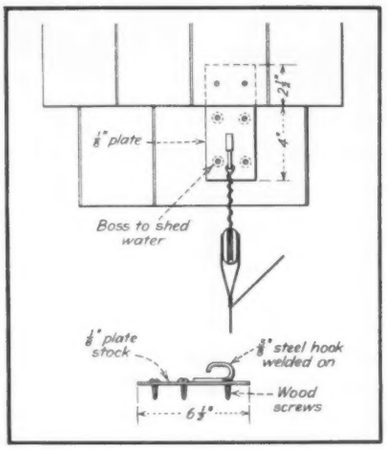
Power's on! Months saved, and you have a completely co-ordinated, factory-tested, dependable equipment.



the solution of the problem. There are two outdoor boilers at this station, each capable of supplying 200,000 lb. of steam per hour to the throttle at 650 lb. pressure, 825 deg. total temperature.

•

Roof Attachment Raises Service Loop



For attaching service loops to houses with low eaves, where loop clearance would not be sufficient to meet code requirements, Public Service Company of Colorado has developed the plate-type strain fastening shown in the accompanying sketch.

This fastening is designed for attachment to the shingles of low eave houses sufficiently far up the roof slope to afford ample ground clearance. The plate fastens to shingles and sheathing of the roof with wood screws and is provided with a hook to "take" the lead from the strain insulator, as shown.

•

Oil Treating Truck for 110-Kv. Cable

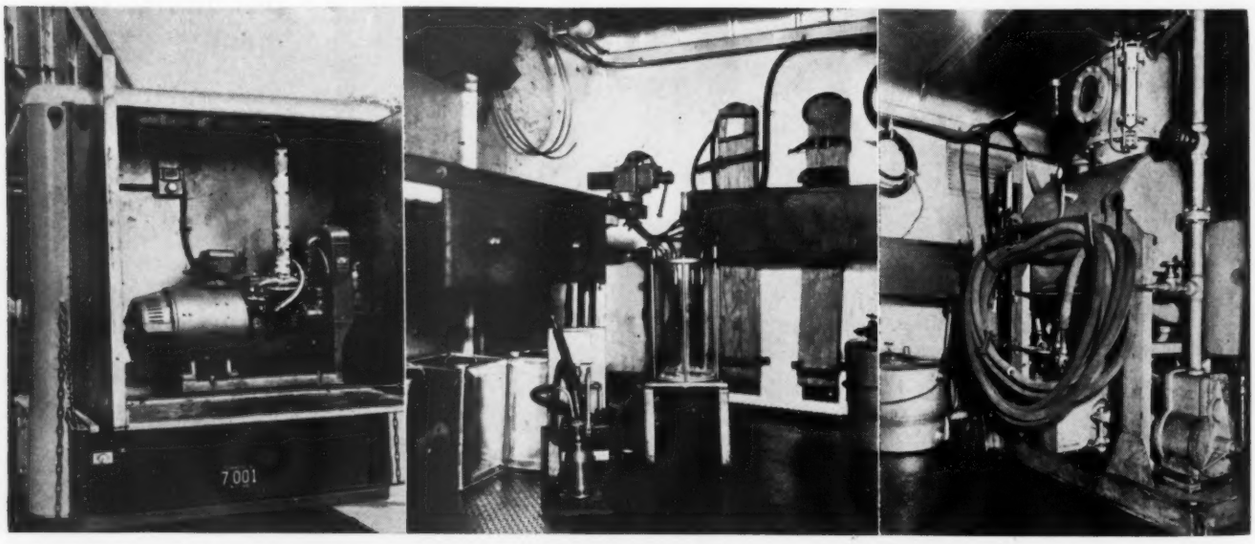
By J. J. O'BRIEN
Superintendent Underground Lines
Narragansett Electric Company, Providence, R. I.

In connection with the installation of a 110-kv. oil-filled cable line for the Narragansett Electric Company in Providence, R. I., it was necessary to assemble in a portable vehicle the apparatus for the vacuum treatment and filling with oil of cable joints, potheads and both temporary and permanent reservoirs. In many similar installations trailer vehicles have been utilized, but it was considered desirable here to have a more mobile unit.

The company had available a 2.5-ton truck chassis on which was built a cab and body with the necessary vacuum and oil treatment apparatus. The body was designed with two compartments. The main or large compartment housed a Buckeye Laboratories, Inc., portable degasifier for cable oil, capacity 65 gal. This is operated by a 2-hp., 220-volt, 6-cycle, a.c. motor. In the main compartment a workbench was built and provided with a vise, and above stockbins were secured to the partition wall to carry the many oil line accessories needed for such work. In one corner of this compartment a wall-mounted bracket and floor socket were installed to secure a 55-lb. cylinder of CO_2 gas used for "flushing out" and "drying out" operations associated with the cable installation.

Two lighting systems were installed, one for operation on a storage battery and the second from a gas engine generator at 110 volts. The main cab is ventilated by a roof ventilator directly above the degasifying chamber of the unit and by louvers (top and bottom) in the sides of the cab at the degasifier unit end of the compartment. The generator compartment is ventilated by vertically operated sections of the cab sides. The entire rear of the cab is opened by making the end a double door. The tailboard when lowered, with the doors opened, forms a convenient and effective extension of length to the truck for maintenance work on the gas engine generator unit. The cab is arranged so that it can be removed at any time for mounting on a different chassis.

Four spacious storage sections were formed by utilizing the space between the truck chassis level and the ground level. These were situated at the front and rear ends of each side of the truck body. The compartment doors were hinged to open downward. These spaces were used for spare oil line and gas line rubber hose, spare oil line fittings, small hand vacuum pumps and coils of ⅜-in. copper tubing for oil and gas connections between joints and reservoirs. Convenience outlets were installed in the main cab and two additional outlets were located at the rear of the truck, one at each side. These



REAR OF TRUCK, showing generator compartment and 7-kva. generating unit (left). Interior compartment showing glass impregnating bottle, manometers, hand-operated vacuum pump, work bench stockbins above bench, and temporary oil tank below bench. (center). Degasifier equipment inside truck (right)

are used for small portable tools and for manhole lighting.

The assembled unit has proved to be adequate and flexible. It requires only a slight additional storage space over the usual trailer type unit and probably represents no more than an equivalent investment. Its instant availability for movement under its own power in an emergency is a valuable asset.

•

New Pike Points for All-Weather Use

Safety and efficiency of the line crews of the Green Bay (Wis.) Electric Department (Wisconsin Public Service) have been greatly improved through the use of pike poles equipped with pike points that are smaller, lighter and have a longer taper than previous designs.

With the introduction of Southern pine poles, troubles were experienced with pikes falling out of poles, causing delays in work as well as endangering the safety of workmen. Electrical supervisors and safety engineers experimented with twisted and feathered edge pike points, which were fairly satisfactory under warm weather conditions, even though they wore smooth. As soon as cold weather set in, however, several accident reports of head injuries due to falling pike poles would call attention to the fact that further improvements were necessary.

The newer points were tried out during the past winter and proved to be the best solution so far. Linemen state that they really hang in a Southern pine pole and that they have to pull to get them out. The decreased weight on the end of the pike poles is an added advantage as they are much easier to handle.

•

Three-Bolt Clamp for Hot Switch Work

By C. TROUT

General Foreman Transmission Maintenance
Cincinnati Gas & Electric Company

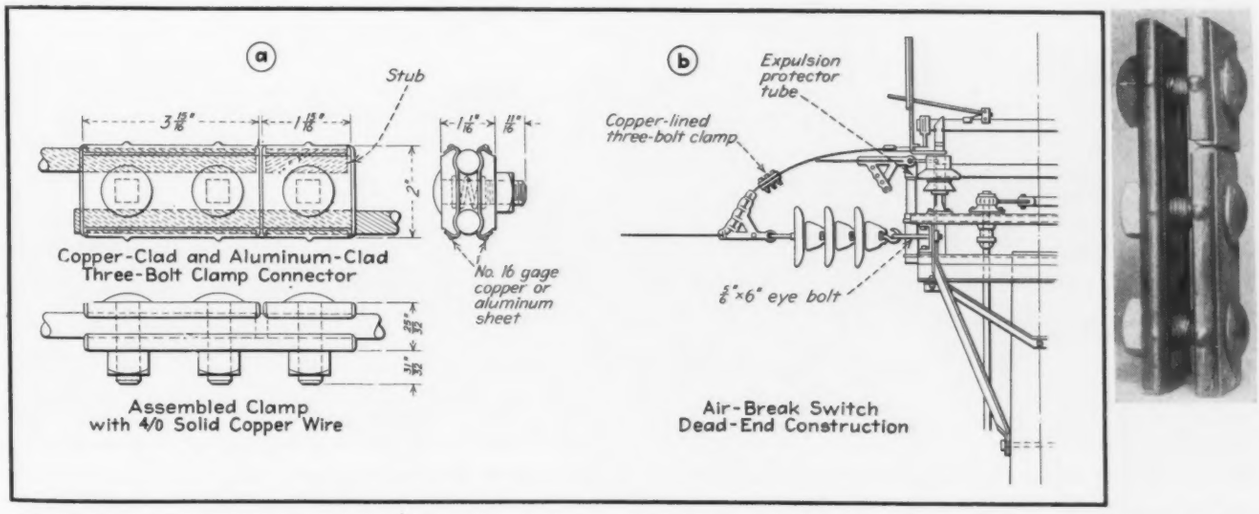
Maintenance of line air-break switches while energized is not an unusual problem. The work is simplified if the switch is not carrying load, making it possible to de-energize one side of the switch. Then it is only necessary to remove the live jumpers and cover the hot dead-ends with protective equipment. But if the switch is carrying load, making it impossible to de-energize the switch, by-pass jumpers can be used and the dead-end connection removed hot.

Main problem is suitable clamps for the jumper connections between the dead-end and the switch terminals. Clamps of sufficient current-carrying capacity and mechanical strength are usually quite expensive and not easily adapted to hot wire maintenance. The Cincinnati Gas & Electric Company for some years has been using an ordinary three-bolt guy clamp, lined with copper or aluminum for all parallel clamp and jumper connections. Since this clamp is satisfactory from a mechanical and electrical standpoint for regular connections, its redesign for switch work was considered.

A special casting was provided, similar to the old guy clamp, but including also a larger space for the wire groove and springs over the bolts as a spacer to hold the sections apart during the installation. Then, by dividing one bolt section, the clamp could easily be adapted to hot wire work.

In application, the one-bolt section is clamped to the dead jumper, making unnecessary the removal of the clamp for future work. For ordinary jumper use both sides of the clamp are utilized, as in the case of other parallel clamps. For larger size wire a small piece of wire is inserted in the opposite side to balance the section. The remaining two-bolt section is used for the remaining jumper connection and is ample in current capacity.

This clamp is suitable for No. 4 to No. 4/0 copper, inclusive, and with an aluminum liner the clamp can be used for No. 4 to No. 0 A.C.S.R. inclusive. The clamp can be installed or removed with ordinary live line maintenance tools and is equally suitable for ordinary line construction and hot wire work.



REDESIGNED three-bolt clamp used for installing by-pass jumpers on hot line air-break switches preparatory to maintenance and details of copper- and aluminum-clad three-bolt clamp (a) and method of application on air-break switch dead-end construction

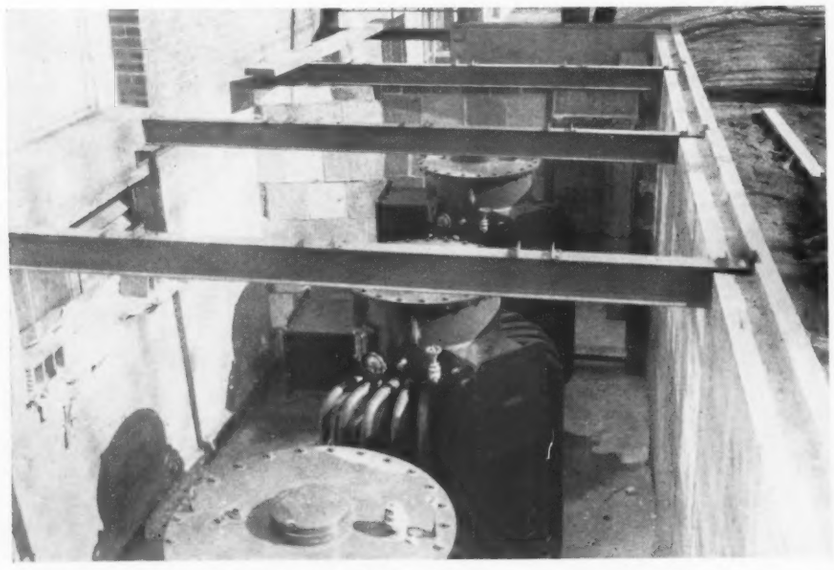
INDUSTRIAL ENGINEERING

Unified Design for Industrial Substation

To meet expansion requirements at the plant of the Warren Telechron Company, Ashland, Mass., a transformer installation including four 333-kva. units has recently been provided, with a new switch room and improved connections to the existing power distributing facilities within the factory. Incoming energy is received from the Boston Edison system over two 13.8-kv. feeders looped through the substation and providing a dual supply. One transformer is a spare, and the installation is General Electric throughout, with effective use of metal-clad compartments for the 13.8-kv. service control and metering and metal-clad housings for low-voltage buses and air circuit breakers for delivery of 125-216-volt energy to the factory's interior equipment.

These improvements include an underground service at 13.8-kv. carried to cubicles assembled as a unit in the new switch room. The high-voltage switchgear is housed in a basement chamber 19 ft. 9 in. long x 18 ft. wide x 7 ft. 8 in. high, the five compartments providing for two separate incoming line oil circuit breakers (FKR 255 B) with 250,000 kva. rupturing capacity each; metering; transformer bank supply, and a control transformer for auxiliary service. A spare compartment space is also provided for a future transformer bank oil circuit breaker. The foregoing switchgear is housed in a space 13 ft. long x 7 ft. wide, including the future cubicle space. The cubicles are 7 ft. 6 in. high, 6 ft. 9 in. deep and 26 in. wide and the inclosed oil circuit breakers are of the built-in elevating type. Buses, current transformers and disconnecting switches are housed in separate compartments, and the disconnects are so interlocked that they cannot be opened if the oil circuit breaker corresponding is closed. Hinged doors are provided on the cubicle fronts for improved accessibility. Potential transformers are of the draw-out type for fuse replacement and the cases and windings are grounded when out.

From the transformer breaker cubicle in the new switch room 3-in. conduits, each with two single-conductor, No. 0 varnished cambric and leaded cables, are run to the transformer vault. The vault is 33 ft. 6 in. long x 10 ft. wide inside, the depth being 8 ft. The grating will be supported by 8-in. I-beams 6 ft. 3 in. apart on centers. An 8-in. wall of concrete incloses three sides of the vault. The low-voltage buses occupy about half the vault and copper bar connections lead to the air circuit breaker cubicles inside the existing switch room. Ground cable of 1,000,000 cir.mil is installed with connections to ground stakes, and the air circuit breakers in the low-voltage switch room are type AL-2, L.U., with an interrupting capacity of 75,000 kva. in each unit.

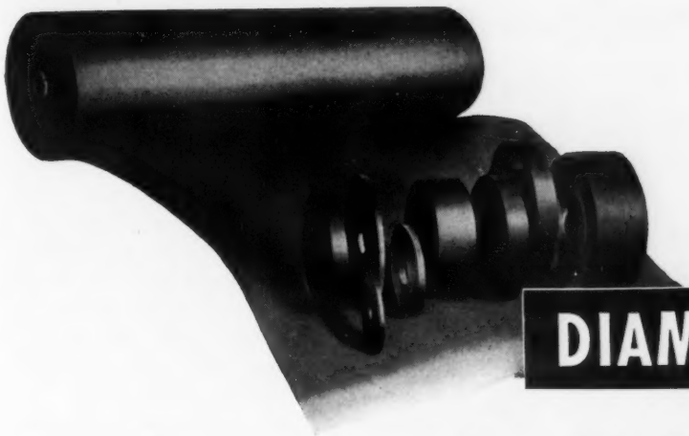


RECESS below sidewalk level houses four 333-kva. transformers. View during construction before installation of metal-clad housings for low-voltage buses. Gratings will cover open vault

•

Grouped Switches Save Investment

Instead of installing a single 3,600-amp., three-pole main circuit breaker and fuse panel at the service entrance of his new plant, a Nebraska manufacturer realized a considerable investment saving by grouping one 1,200-amp. and four 600-amp. fused disconnect switches in parallel at the service entrance to serve as the plant's



DIAMOND INSULATION

for high speed production

OF THIN . . . TOUGH . . . PLIABLE . . . *Electrical Insulating* PARTS . . . LININGS . . . BACKINGS . . .

DIAMOND INSULATION . . . C-D's superior quality "fish paper" . . . is admirably adapted to high speed fabrication of punched insulating parts; of formed, scored and shaped liners, backings and other insulating pieces. By a special method of controlling fibre direction (grain) in the making of the basic paper stock DIAMOND INSULATION is almost as strong against the grain as with it and is readily formed, bent, scored or shaped in both directions.

It is made in continuous rolls for automatic feeding of high speed fabrication machinery. These rolls are available in any width up to approximately 48″ wide in thicknesses from .004″ to and including 1/32″. Over 1/32″ thick, standard sheets approximately 48″ x 80″ are available.

A new grade of moisture resistant DIAMOND INSULATION known as grade WR is also now available. Its moisture resistance is almost as great as that of phenol fibre. It retains to a high degree the basic DIAMOND INSULATION properties of tough hardness, flexibility, and abrasion resistance, and has high electrical insulating properties.

***Send for samples* . . . make your own tests to determine the TOUGHNESS . . . BENDING PROPERTIES . . . SURFACE HARDNESS . . . ELECTRICAL INSULATING QUALITIES of DIAMOND INSULATION**

To Lengthen the Life of Product Performance

Every time the C-D Research Laboratory studies a manufacturer's use of electrical insulating materials, suggestions usually result which improve product performance, lengthen useful life, cut costs or in some way benefit the customer.

Let us study your use of laminated plastics; vulcanized fibre, mica, or other non-metallic materials. Chances are good that we'll uncover some opportunity for you to speed up production, cut down maintenance costs, improve product dependability or find some other way to help you make more money. Write us today at 12 Chapel Street, Newark, Delaware.

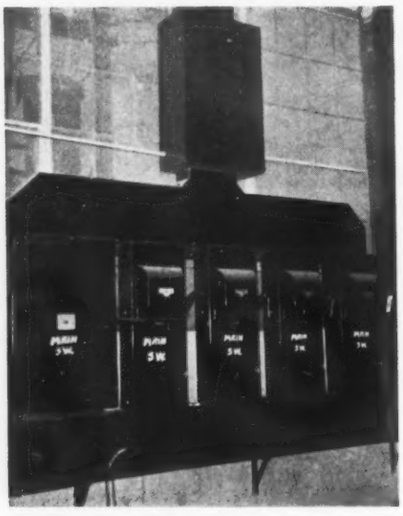
Send TODAY for this booklet! **. Ask for GF 12**

Complete Data on all C-D Non-metallic Products

Continental-Diamond FIBRE COMPANY

"Manufacturers of Laminated Plastics Since 1911" — NEWARK • DELAWARE

TRANSFORMER bank and service loop



ONE 1,200-amp. and four 600-amp. fused switches grouped in parallel at plant service entrance avoid investment in breaker and fuse panel

Raising 220-V. Factory Wiring to 440 V.—III

By EUGENE CALDWELL
Consulting Management Engineer, Milwaukee, Wis.

Greater economy often possible by raising industrial plant voltage from 220 to 440 when increased capacity is needed, instead of installing heavier wiring, and the costs of adapting motors and control to the higher voltage, were treated in preceding articles of this series.* What is to be done about switching equipment is the subject of this installment.

Safety switches must be replaced entirely since the 220-volt spacings and clearances are not adequate for 440 volts. In many parts of the country local laws and ordinances prevent the sale of used safety switches. Consequently the old safety switches have little or no salvage value.

Switching equipment at distribution centers usually has to be changed, too. New type dead-front distribution panels frequently work out better than separate safety switches. Usually it is the case that these distribution centers are antiquated equipment which would not be permitted under the present code if installed now. Consequently sometimes part of this expense is justifiable as revamping and modernizing obsolete equipment.

An interesting example of savings even in switching equipment by going to higher voltages is seen in the same Midwestern plant referred to in a preceding installment of this series. When operating at 220 volts a 600-amp. main entrance switch was in service, but this was found too small. In fact, the load could not be carried with the largest size fuse it was possible to install in this size switch. If the changeover had not been made it would have been necessary to purchase an 800-amp., 220-volt switch, but with the voltage raised to 440 a 600-amp. switch was ample (the 600-amp., 220-volt switch could not be used, however). The 600-amp., 440-volt switch cost $93 less than an 800-amp., 220-volt switch, notwithstanding the fact that the 600-amp., 440-volt switch is equivalent in power carrying capacity to a 1,200-amp., 220-volt switch.

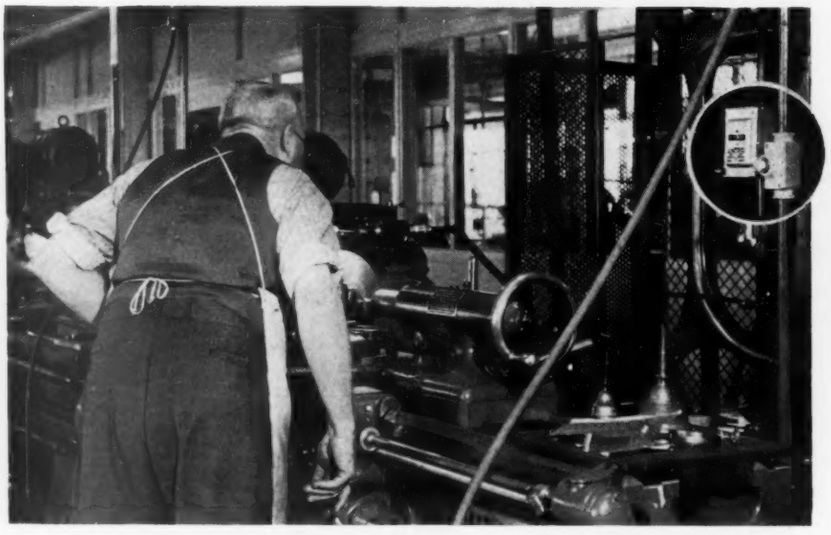
* "Electrical World," May 3 and May 31, 1941.

main "disconnecting means"—as permitted under the National Electrical Code. Arrangement is shown in the accompanying illustrations.

The plant is served at 240 volts, three-phase delta from a 225-kva. transformer bank, which steps voltage down from 13,200 volts. Service is designed for an eventual plant load of 1,000 kva. Present load is under 300 kva. From the transformer bank four 1,000,000-circ.mil cables make up the service loop (the two outside wires constitute one conductor). At the service head six 1,000,000-circ. mil cables are connected to each phase wire of the loop and these pass through the building wall to a metal-inclosed busway and metering transformer compartment and fan out to the five switches. Three 1,000,000-circ.mil cables pass to each of the three 600-amp., three-pole switches, while six cables, two per phase, go to the 1,200-amp. switch. From the switches, busway and conduit distribute 240-volt power throughout the plant.

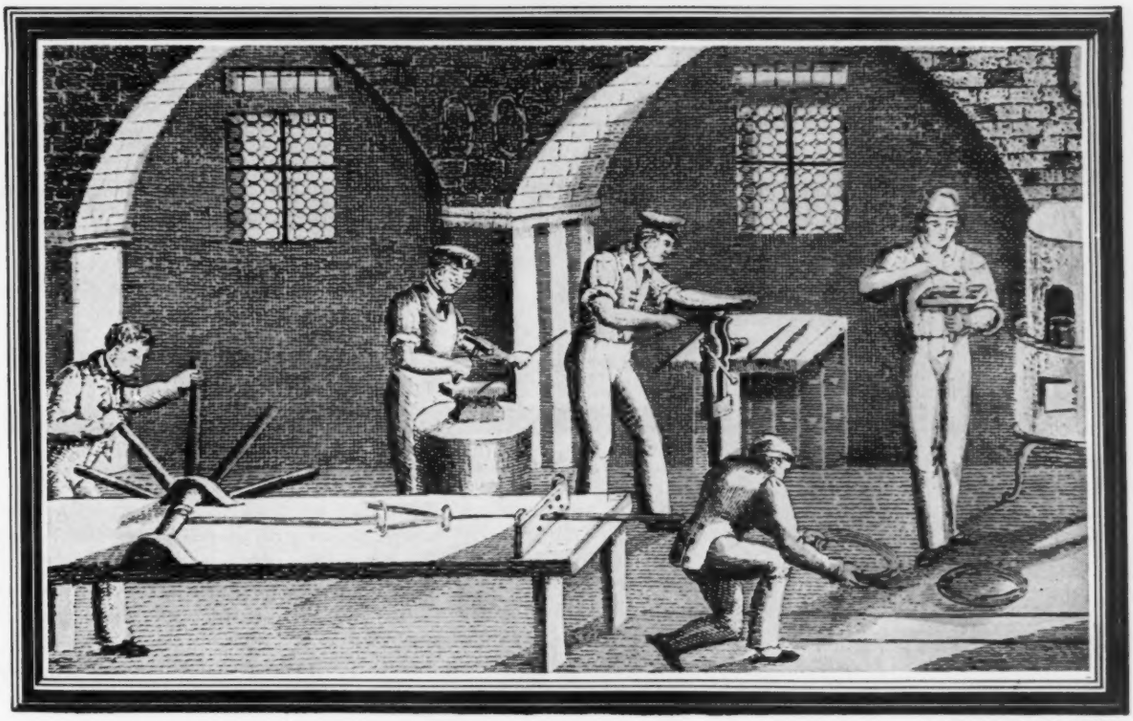
• • •

Telltale Lamp for Hidden Motors



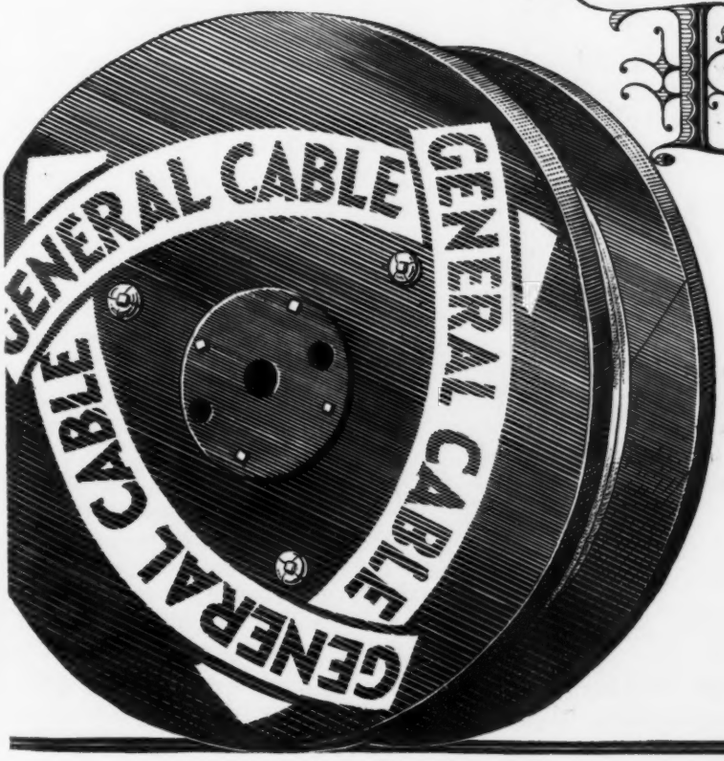
With motors mostly out of sight or inclosed on modern machine tools operators occasionally leave them running at quitting time because they have no visual reminder that the motor is on.

In order to correct this condition Sangamo Electric Company, Springfield, Ill., has put low-wattage signal lamps in the motor supply circuit on machine tools. The lamp is located right beside the motor switch. Now if the operator should forget, and he doesn't often, the watchman can detect it and cut the motor off without touching the machine.



Engraved in 1828, this record of early wire manufacture would seem to indicate that straight-line production was even then in vogue.

BETTMANN ARCHIVES



RAPID ADVANCES in the use of electricity for light, power and communications have greatly complicated the art of cable manufacture. Constant research in both cable design and production methods have, however, maintained General Cable Corporation in a preeminent position in the industry.

GENERAL CABLE

BARE and INSULATED WIRES and CABLES for EVERY ELECTRICAL PURPOSE

General Cable Corporation Sales Offices: ATLANTA • BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT • HOUSTON KANSAS CITY (MO.) • LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • ROME (N.Y.) • ST. LOUIS • SAN FRANCISCO • SEATTLE • WASHINGTON (D.C.)

NEW ENGINEERING IDEAS

How to Give Protector Tubes a Chance

By S. L. GOLDSBOROUGH
Relay Engineer
Westinghouse Electric & Manufacturing Company, Newark, N. J.

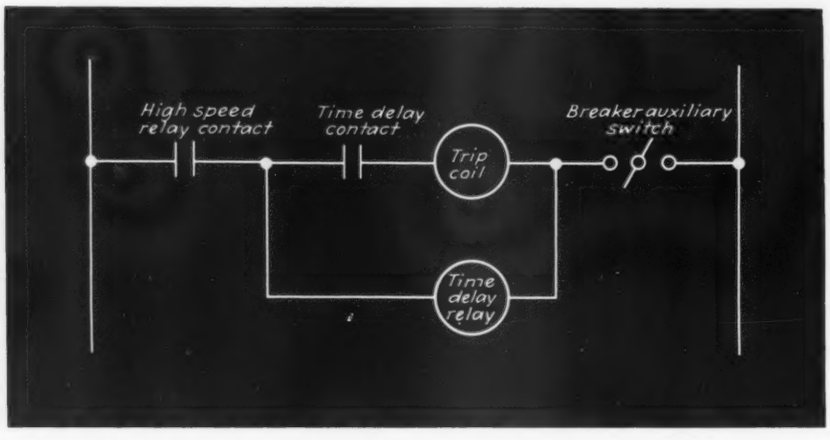
High-speed relays were doing their work too well for a power company with a 34.5-kv. transmission line protected by protector tubes. During lightning storms the relays were operating too quickly; they were not giving the tubes opportunity to discharge the surges. The result was unnecessary operation of the line breakers and outages of the line.

A protector tube usually operates to bypass the surge current around an insulator string to ground in one-half to one cycle. High-speed impedance relays regularly operate in one-half cycle. Hence, it is quite possible for the relays to initiate the opening of the breakers at the section ends before the tubes have had a chance to function.

To delay the high-speed relays for a matter of a half-cycle an auxiliary relay may be interposed in the high-speed relay circuit. When the contacts of the impedance relay close, the relay current is sent through the auxiliary relay instead of directly to the trip coil of the breaker. The trip coil circuit is held open by the auxiliary relay contacts. These contacts close in about one cycle, however, completing the circuit to the circuit breaker if the high-speed contacts are still closed.

The delay imposed by the auxiliary relay is sufficient to allow the protector tubes to clear the fault if they can do so. When the fault is cleared through the tube the high-speed relay contacts open before the auxiliary relay completes the trip circuit and the whole system is reset. In case the fault is not cleared the breaker is tripped in the regular way, with only an additional cycle delay.

With this circuit the contacts of the high-speed relay and of the time-delay relay are in series, which prevent the possibility of incorrect trip-out because of overshoot of the time-delay relay after it is initially energized.



INSERTION of auxiliary relay delays high-speed relay to give protector tubes a chance

It might reasonably be asked why such delay is necessary, since the protector tubes clear only ground faults, while the impedance relays are phase devices, responding to phase-to-phase, two-phase-to-ground, or three-phase faults. However, when several tubes are discharging simultaneously, as they may do on adjacent towers following a lightning surge, the effect is that of a short circuit between phases, which the impedance relays recognize as a phase fault. Furthermore, on long lines where the impedance phase relays have a sensitive setting they can respond to surges occurring close to the relay location.

•

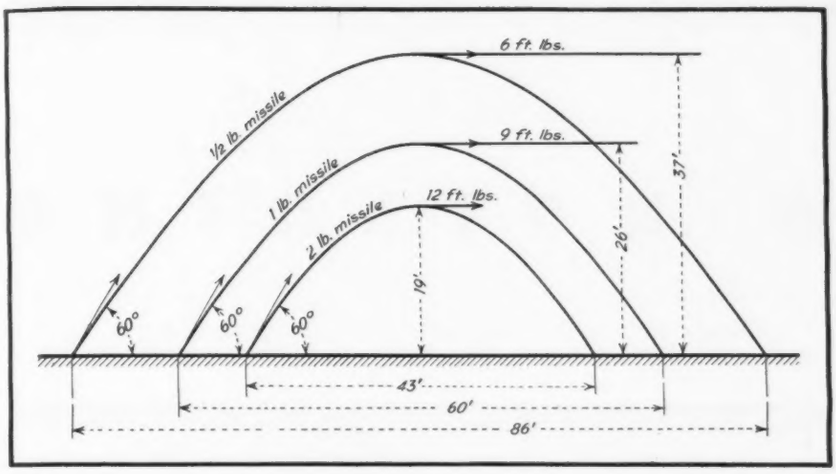
Insulators as Rock and Bullet Targets

By J. J. TAYLOR
Assistant to Chief Engineer
Ohio Brass Company, Barberton

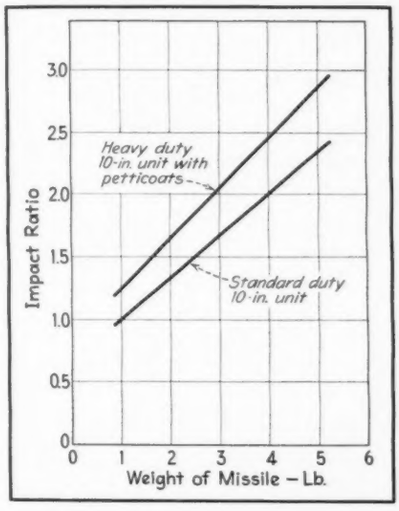
To determine how much impact resistance an insulator should have an analysis was made of likely values of the propulsive forces, the weight and velocity and trajectory of the missile. This introduces the difficult matter of estimating the "standard boy" and the "standard rock." Our guess is that the "standard boy" might throw—

1. A ½-lb. missile with an imparted energy of 25 ft.-lb.
2. A 1-lb. missile with an imparted energy of 35-ft.-lb.
3. A 2-lb. missile with an imparted energy of 50 ft.-lb.

For maximum elevation the missile would probably be thrown at 60 deg. to horizontal, and for the above cases this results, respectively, in the following foot-pound components of 19, 26 and 37; the horizontal components are 6, 9 and 12 as shown in the ac-



STANDARDIZED missiles indicate requirements for standardized insulator units. Trajectories, height of rise and impact energy of missiles thrown by muscular arm effort



VARIATION in impact resistance value of standard and heavy-duty 10-in. units

Impact value of 1-lb. missile is taken as reference value for the impact ratios.

companying illustration. Except perhaps for lines on railroad rights-of-way, the majority of suspension insulators in service are apparently out of range for 1- and 2-lb. missiles.

If a missile of low air resistance and of ½-lb. weight is thrown at maximum velocity and hits squarely on the surface of a standard suspension insulator the breaking or chipping of the insulator may be expected. The great majority will be deflected harmlessly because of oblique impact.

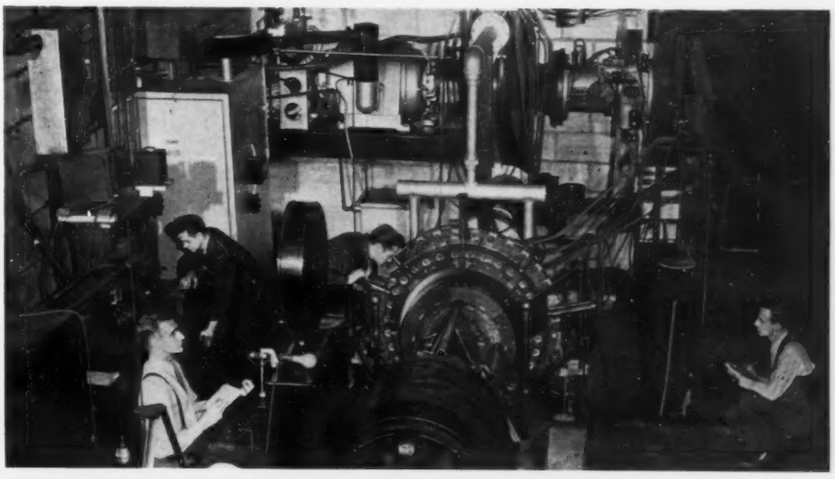
All studies on rifle fire seem to indicate little correlation between tested impact strength of suspension insulators and their resistance to rifle fire. Impact energy may range from 50 ft.-lb. for a 0.22 short bullet fired at 150 yd. to several thousand foot-pounds for large calibre ammunition. To resist such large amounts of impact energy the insulator must rely on flange smoothness and thickness. Petticoatless units are effective against small calibre, low-velocity bullets, particularly for glancing shots. The petticoated, heavy-duty units will resist a 0.22 shot. None of these designs is immune to damage from higher energy contents at impact. Variation of impact value of standard and heavy-duty 10-in. suspension insulators are shown in an accompanying illustration. The heavy-duty unit has 25 per cent better impact resistance to a 1-lb. missile than the standard duty unit.

Air Turbine Speeds Development Work

By the use of an air turbine simulating the operation of a turbine but using air instead of steam for driving energy, experimental changes and new designs of bucket wheels and diaphragm assemblies which formerly went from the drawing board to a completed turbine on test are now first put through their paces in the air test laboratory of the General Electric Company at Schenectady, N. Y.

In operation about a year, the air turbine permits tests on diaphragms and bucket assemblies up to 38 in. Data obtained on these assemblies can be extended mathematically to larger wheels and diaphragms. While the air test turbine accommodates only a single stage at a time, this is an advantage in that the diaphragm and wheel need not be inclosed. Operators can observe changes in velocity and direction of the air while a test is in progress.

Air used in the tests is piped through a Venturi meter into the diaphragm casing from a centrifugal compressor. Power received by the turbine wheel is converted into d.c. for a motor driving a synchronous generator which holds speed pulsations to a minimum. A.c. from the generator goes back into the line to furnish power for the compressor.



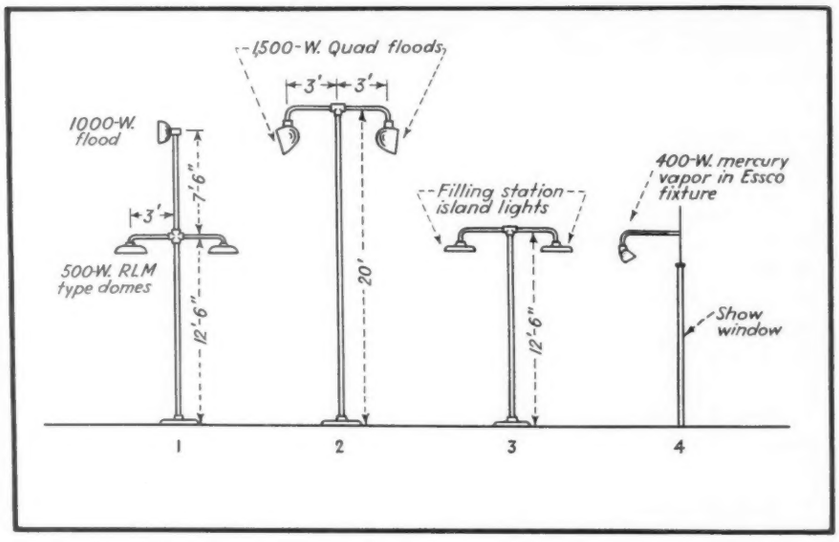
AIR TURBINE tests and aids improvements in efficiencies of bucket wheels and diaphragm assemblies

Operator at left foreground reads torque developed by turbine on scale. Clearance between wheel and diaphragm is being checked by operator bending over turbine and air flow is being checked by operator at right. Air flow is determined by draft gage readings of differences in pressure across Venturi meter—as low as 0.004 in. of water may be read. Man in left background controls speed of turbine—adjustable to 4,000 r.p.m.—by adjusting field current of dynamometer. Speed may be measured by tachometer to an accuracy of about 1/50 of one percent.

LOAD BUILDING

Used-Car Lots Good Lighting Prospects

In such a highly competitive field as the used-car business, individual operators keep a keen eye on activities of other dealers—and particularly on the leader in the field. This "follow-the-leader" tendency, in a business where nearly every dealer operates an outdoor display lot (more often than not poorly lighted), makes it an unusually fertile field for the promotion of display floodlighting. For, generally speaking, once a key dealer reacts to concentrated selling effort by installing an outstanding display lighting job other dealers can be counted on to fall quickly in line rather than be left literally "in the shade" with dimly lighted premises. Take the case of the dealers in Dayton, Ohio, for example.



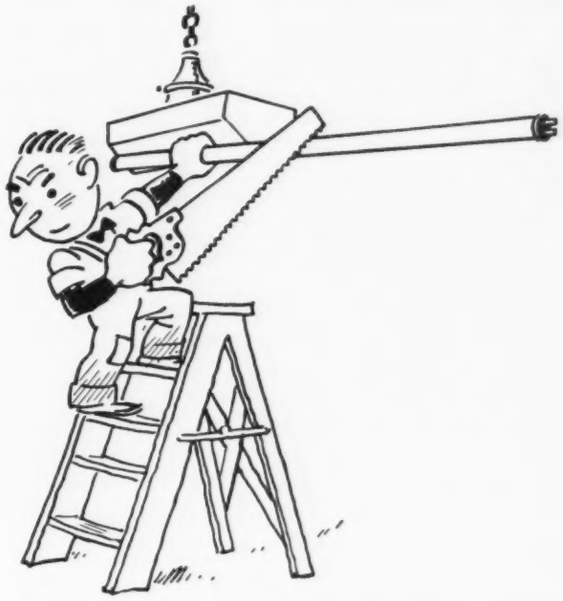
FOUR METHODS of lighting used-car lots

In this city, as the result of a single dealer's initiative in floodlighting his place of business, three other used-car lots "stepped up" the lighting of their lots to the tune of a total of 42.25 kw. connected load. For obvious reasons the name of this first dealer can't be disclosed, but two other jobs are shown here. Either of them is good enough to have started the landslide.

Once the movement started each dealer wanted to have a lighting installation as good as the next, but

ONE of these installations started an epidemic of display floodlighting in Dayton used-car lots. Left—S-W-S Chevrolet Company lot 100x60 ft. has 17.5 kw. of lighting arranged as in sketch No. 1. Right—White Allen combined mercury-vapor floodlighting (sketch No. 4) with decorative luminous tube lighting on building

"It's no use, Ed, that long F Lamp won't fit that 20-Watt Fixture!"



HERE'S a joint problem . . . yours and ours . . . to see that good fluorescent lighting installations are made in the first place. This man's 20-watt fixture, though good, just wasn't big enough for the job. Unfortunately, right now he can't put in a larger lamp to get the light he needs. Too many businesses have installed fluorescent lighting just to cut the electric bill. Not enough of them have been sold on engineered lighting or the amount of light they need in order to produce maximum profits.

HERE'S WHAT 100 MERCHANTS SAID

In a recent survey, 100 store owners were asked, "If you were improving the lighting in your store, how much more light do you think you ought to have?" With average present lighting of around 10 footcandles, a quarter of them said, "No more," and only one ventured as high as 30 footcandles. None seemed to think that 50 footcandles or more were necessary. This, despite the fact that progressive merchants who know the close relationship between light and selling are making sales increases directly traceable to their higher level light installations.

WHO WILL TELL THEM THE FACTS?

Lighting company representatives constitute the only group large enough in number, who know the facts about lighting, and who can spend the time to tell the story of better lighting and its advantages to the average store and average industrial plant. This group is the hope of the lighting industry in helping contractors, fixture salesmen, and distributors' men, locally, to spread the gospel of the need for selling engineered lighting, and to tell the facts about increasing sales and producing fewer rejects, less spoilage, and better morale.

G.E. HAS HELPS TO HELP YOU

To help utility men sell the higher lighting levels needed, General Electric now has available several new sales tools including:

1 G-E Footcandle Selectometer—a device which the customer operates himself to determine how many footcandles he would like to have for proper seeing.

2 A sales presentation easel and sales manual—with pictures, short copy, and sales ideas; to be used by the salesman talking either commercial or industrial lighting.

3 The Seeing Spinner that demonstrates how good lighting speeds seeing.

4 A visibility meter or seeing selector which provides a means for demonstrating to the customer how good light makes seeing easier and quicker.

IN ADDITION, General Electric has slide films, booklets, direct mail pieces, and a manual of ideas—detailed suggestions for planning and carrying out a complete industrial and commercial lighting program. For complete information, see your General Electric lamp representative. General Electric Company, Nela Park, Cleveland, Ohio.

G-E MAZDA LAMPS
GENERAL ELECTRIC

Made to stay brighter longer

HAVE YOU JOINED *the 49-er club?* **SEE YOUR G-E LAMP REPRESENTATIVE!**

they generally objected to a duplicate installation. The usual request was for an installation "better than Joe's." Each of the Dayton installations, that were engineered by the Dayton Power & Light Company, were therefore essentially different. The accompanying sketches illustrate several of the treatments used.

In the case of the S-W-S Chevrolet Company the arrangement illustrated in sketch No. 1 was used. The lot is 60x100 ft. and bounded on two sides by streets. At the sidewalk edge on these two sides of the lot nine metal masts were erected. On these masts, 12 ft. 6 in. from the ground and parallel to the streets, are two 500-watt R.L.M. type domes on the ends of 3-ft. arms extending out from the pole. Some 6 ft. above the arm a 1,000-watt flood is mounted and directed toward the center of the lot. Total load is 17 kw. Chief advantage of this treatment is the fact that the R.L.M. domes highlight the shiny hoods of cars lined up along the sidewalk edge, while top floodlights provide general illumination.

Reliable Motors has a 90x100-ft. lot which was lighted by applying the treatment No. 2. Thirteen 750-watt "quad" floodlights were mounted at 20 ft. from the ground on 30-ft. spacings. Some of the lights are mounted on adjacent buildings, but most are mounted on masts as shown.

Outside of the White-Allen sales building is lighted by thirteen 400-watt, high-pressure (treatment No. 4) mercury-vapor lamps in ESSCO units mounted above each of the show windows and above the entrance of the used-car lot. The building façade was also decorated with Zeon type luminous tube lighting as shown in the illustration.

Still another establishment in Dayton makes effective use of a number of conventional filling station island lights on 30-ft. spacings. This arrangement is illustrated in sketch No. 3.

However, all of these installations, of whatever type, were, with one exception, the direct result of a single installation of modern night floodlighting undertaken by a recognized leader in the local used-car field.

•

Cheap Electricity Now Theme of Utah Power

Effective utilization of small space advertising to amplify the slogan "Electricity is Cheap" has been developed by Utah Power & Light Company for a campaign currently running in Utah newspapers. Net result, according to M. L. Cummings, manager of sales promotion and advertising, has been to build up an increasing public appreciation of the story of low-cost electricity.

The program ties in directly with the company's dealer co-operative activity. In its 1941 plans the sales department furnished dealers with promotional material emphasizing the low cost of electric service. The series of small space ads is designed to answer the question "How cheap?" Frequency of insertion is one of the features of the campaign, ads appearing at the rate of six per month. The copy carries no signature. Each ad features the operating cost of one appliance.

•

Boston Analysis of Fry Kettle Economies

Based on a week's test in the field, a 1 per cent saving in food through the use of an electric fry kettle compared with a gas-heated equipment realizes $92.60 per month for the cafeteria owner doing a gross business of $20,000 per month, according to data recently presented by J. L. Faden of Boston Edison at a meeting of the Lunchroom Managers' division of the American Home Economics Association.

The electric kettle was rated at 7 kw. and the same quantity of food was fried in each type of equipment. The first cost of the equipment was approximately the same.

The test was as follows:

	Heat Supplied		Heat Utilized
Electric	73.4 kw.-hr.	250,000 B.t.u.	110,000 B.t.u.
Gas	1,600 cu. ft.	848,000 B.t.u.	110,000 B.t.u.

The gas heat input was about 3.4 times that of the electric for the same quantity of food.

To give equal fuel and electric operating cost the customer should pay:

$$\frac{73.4 \text{ kw.-hr.} \times 1.5 \text{ cents}}{1{,}600 \text{ cu.ft.}} = 68.7 \text{ cents gas rate per M cu.ft.}$$

On the basis of 25 per cent fat saving with the electric kettle and using 400 pounds of fat per month at 12 cents per pound we have $12.

Gas cost per month = 68.7 cents × 1,600 cu. ft. × 4.33 (weeks)	$ 4.75
Extra fat cost =	12.00
Total gas cost	$16.75

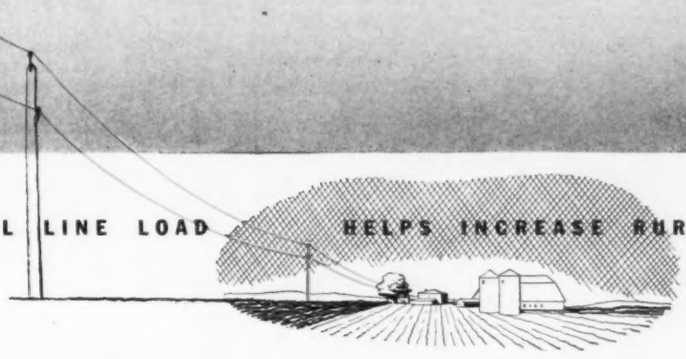
Finally

$$\frac{\$16.75}{73.4 \times 4.33} = 5.27 \text{ cents per kw.-hr., or the electric rate required to equal 68-cent gas with allowance for fat saving.}$$

ELECTRICITY IS Cheap
RUNS STOKER FOR FULL MONTH IN AVERAGE HOME FOR ONLY 60¢
ELECTRICITY IS Cheap
BRINGS AVERAGE HOME WORLD'S FINEST RADIO PROGRAMS THROUGH TABLE RADIO FOR ONLY 16¢ A MONTH
ELECTRICITY IS Cheap
OPERATES HOT PLATE IN AVERAGE HOME FOR ONLY 20¢ A MONTH

SAMPLES of a series of small space ads (1 col. x 5 in.) Utah Power & Light Company is using to tell story of low-cost electricity

COPPERWELD-COPPER Dependability



HELPS BUILD RURAL LINE LOAD

HELPS INCREASE RURAL LINE REVENUE

IT'S good-bye to lantern and water bucket when the farmer learns that he can depend on his rural line service for *reliable* low cost light and power. And when kilowatt hours replace hours of hand drudgery rural line load goes up and rural revenues increase.

Good conductors, good engineering, and good construction all contribute to the dependability of rural line service.

Only in Copperweld-Copper conductors will you get *all* these dependability features: PERMANENT HIGH STRENGTH; VIBRATION-REDUCING THREE-WIRE STRAND; SIMPLE TIES; COMPLETELY NON-RUSTING CONDUCTORS.

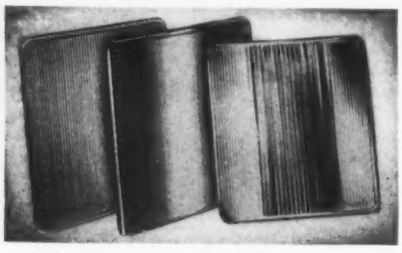
Copperweld Steel Company • GLASSPORT, PA.

COPPERWELD-COPPER CONDUCTORS

NEW EQUIPMENT

Light Control

Controlenses are available in three prismatic glass lenses for controlled fluorescent lighting. Intensive type produces the distribution of light most commonly used in



Controlense (left to right), intensive, concentrating and extensive. **Holophane Company, Inc.**, 342 Madison Ave., New York, N. Y.

both commercial and industrial interiors. Concentrating type produces a rigidly confined focusing type of light distribution. Extensive type is particularly adaptable for areas where the lighting of vertical surfaces is desired, or in low-ceiling areas to permit economical wide spacing of units.

•

Starter

"Bulletin 709, Size 4," solenoid starter; maximum rating, 50 hp., 220 volts, and 100 hp., 440-550-660 volts. **Allen-Bradley Co.**, Milwaukee, Wis.

Development of this larger starter, employing the solenoid design, reduces its size and replaces the company's clapper type starter. Current of at least ten times the maximum horsepower rating is easily interrupted, it is claimed. Inclosures are available to meet various NEMA classifications.

•

Air Circuit Breaker

Air circuit breaker in explosion-proof boxes; rated 25,000 amp. interrupting capacity, 600 volts a.c., 250 volts, d.c., for continuous currents up to 600 amp. **General Electric Co.**, Schenectady, N. Y.

For applications in all groups of Class I locations as defined in the National Electrical Code, G.E. type AE-1B breakers are now available in explosion-proof boxes. The unit is mounted on hinges in the box, and with the cover open, is completely accessible for inspection and routine maintenance. As with other breakers in the line, the manually operated unit may be closed by the turn of a pistol-grip handle; the electrically operated unit, by a push button on the breaker or by a control switch at a remote position.

•

Breakers

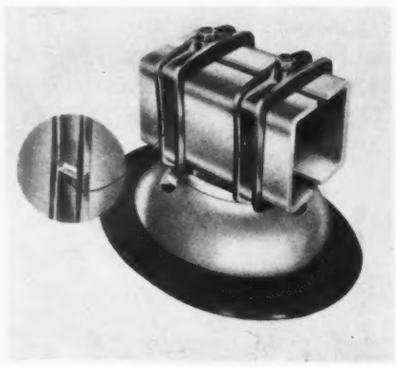
Types "C-1," "CB" and "CBC" breakers. **Arrow-Hart & Hegeman Electric Co.**, Hartford, Conn.

New line of flush and surface mounted breakers simplifies listing. A stock of only three sizes of boxes accommodates combinations of all three breaker units.

•

Bus Support Clamp

This bus type of clamp is said to provide a rigid support for channel bus bar. It may be used alternatively as a slide fit support or as a rigid support by clamping the caps in the desired position. Cen-



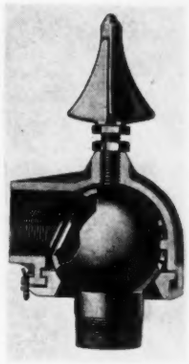
Type "BH" bus support clamp for channel. **Burndy Engineering Co., Inc.**, 459 East 133d St., New York, N. Y.

ter clamping studs and guide ridges insure proper spacing of the copper channels. Furnished for use on either 3- or 5-in. bolt circle. Circled inset shows position of the clamp when a slide fit on the conductor is desired.

BUYING ELECTRICAL EQUIPMENT?—McGraw-Hill's *Electrical Buyers Reference* is a convenient place to look first for manufacturers' product data, names and addresses.

Levelite

Ball-and-socket design of levelite permits street-lighting units attached to brackets to be leveled or tilted as much as 17 deg. to any side of vertical. Rigid setting in position is maintained by a single spearhead bolt and lock nut.



Levelite, for 1¼- and 2-in. pipe. **Hubbard & Company**, Pittsburgh, Pa.

•

Air-Conditioning Units

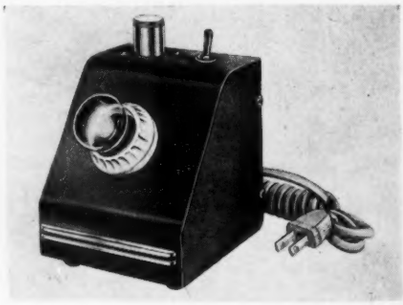
Plug-in air-conditioning units. **Westinghouse Electric & Mfg. Co.**, East Springfield, Mass.

Two new models of air-conditioning units that cool the air, filter out dust and dirt and circulate the conditioned air have been announced by the company. One model has a ½-hp. condensing unit that cools 200 cu.ft. of air per minute and requires a minimum window opening 15⅝ in. high by 27 in. wide. The console model has a ¾-hp. condensing unit that cools 330 cu.ft. of air per minute and requires a minimum window opening 7½ in. high by 26½ in. wide.

•

Starter Switch Tester

Tester is a unit equipment for checking both 15-20 and 30-40-watt fluorescent lamp starters of standard types. Unit is plugged into convenience outlet. Starter is



Fluorescent starter switch tester. **Federal Engineering Co.**, St. Albans, N. Y.

WHEN YOU BUY **HUBBARD 4-11-44 WIREHOLDERS**
THEY HAVE BEEN EXPOSED TO A MOST CAREFUL SCRUTINY FOR MANY YEARS—AND FIELD TESTED "BY THE CARLOAD."

HUBBARD AND COMPANY
PITTSBURGH . . . OAKLAND . . . CALIFORNIA . . . CHICAGO

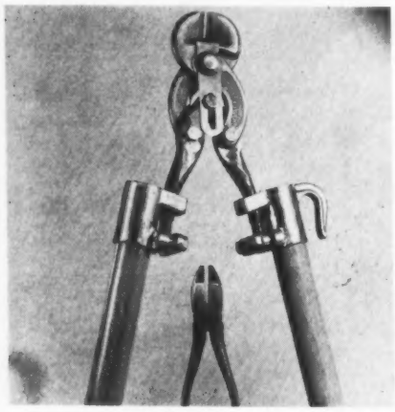
"HANG THE LOAD ON HUBBARD HARDWARE"

placed in tester socket. Indicator lamp denotes whether or not switch is in good condition.

•

Insulated Cutter

Oak poles either 1¼ in. or 1⅛ in. diameter are furnished with a new insulated cutter. Jaws on the large cutter will take a No.



Insulated cutter. **James R. Kearney Corporation,** St. Louis, Mo.

4/0 stranded copper conductor. New handles will also accommodate 8-in. or 10-in. gas pliers and 8-in. or 9-in. lineman's pliers.

•

Water Level Telemeter

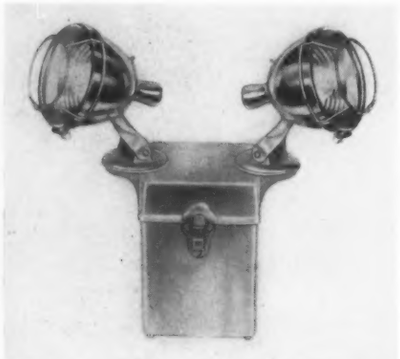
Water level meter and telemeter for headwater range of 90 ft. **Control Corporation,** Minneapolis, Minn.

Elevation of headwater at a hydro-electric plant can be metered and telemetered by an equipment which consists of a gage board 12 ft. 10 in. long, supporting a telemeter transmitter and a 1-in. mercury U-tube. Readings to a 0.2-ft. accuracy are claimed. Readings from a counterweight in the form of a pointer are transmitted to a telemeter receiver where they are combined with the telemeter reading of the tailwater to obtain readings of the static head on a third meter.

•

Master-Light

Designed for automatic emergency light, this master-light is a unit consisting of



Type "DUL" Master-Light; weight, 42 lb. **Carpenter Manufacturing Co.,** Cambridge, Mass.

two lightheads, an automatic switch-over relay and self-contained battery. One light illuminates a 10,000-sq.ft. area and the other projects a 250,000-cp. beam for distances of a few feet up to a mile, it is claimed. Relay connects lights to battery when 110-120-volt service fails. Rechargable battery has capacity for emergency lighting of a reasonable size room for a full night.

•

Service Equipment

Raintight service equipment; 60-amp. main and range switches with either 0, 2 or 4-plug fusible lighting circuits. **Square D Company,** Detroit, Mich.

Raintight service equipment has been extended to include inclosures in line with recent rulings brought about by the National Electrical Code (Sec. 380, Art. 3804). Inclosures have watertight tops and overlapping flanges on cover. Knockouts are located below lowest live parts. A drip hole in bottom prevents accumulation of moisture.

•

Tester

Tester is plugged into the line, and the appliance, in turn, into a receptacle provided on the face of the tester. Two two-

Model "417" pocket size tester; ranges for a.c. and d.c. circuits, up to 250 volts, four up to 25 amp. and four up to 3,000 watts. **Radio City Products Co.,** 88 Park Place, New York, N. Y.

position toggle switches and a three-position rotary switch permit instant selection of type of measurement and meter range desired. It is suitable for appliances and motors up to several horsepower.

•

Ratchet Relay

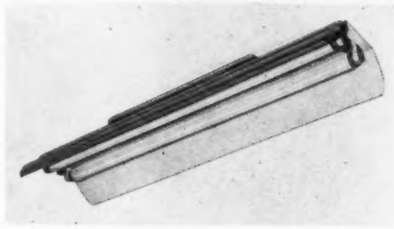
Type "CX 2600" ratchet relay; contact rating for non-inductive load—6 amp., 110 volts, or 3 amp., 220 volts, a.c., or 1 amp., 115 volts, d.c. Coils available from 6 to 220 volts, a.c., or 2 to 230 volts, d.c. **Struthers-Dunn, Inc.,** 1355 Cherry St., Philadelphia, Pa.

New midget ratchet relay has two independent poles and, by adjustment of its cams, may be made single-pole, double-break, single-throw; double-pole, single-break, single-throw, or single-pole, single-break, double-throw. Units are designed for front-connected vertical mounting and are available for both intermittent and continuous duty.

•

Fluorescent Unit

Latest industrial fluorescent unit announced by the company is provided with two 100-watt fluorescent lamps, for mount-



"Miraflume F-235" fluorescent unit with two 100-watt fluorescent lamps; output 8400 lumens. **Hygrade Sylvania Corp.,** Ipswich, Mass.

ing near the ceiling in high-studded areas. Working parts are carried in the housing. Reflector carries only its own weight. Four captive latches connect reflector top with the housing.

•

TECHNICAL LITERATURE

REPORT—Definitions, characteristics and performance, rating tests and application information for protector tubes are covered in publication A.I.E.E. No. 24, "Report on Proposed Standards for Protector Tubes." Copy may be obtained from American Institute of Electrical Engineers, 33 West 39th St., New York, N. Y. The standards apply to all types of protector tubes designed to limit voltage surges on 60-cycle a.c. power circuits.

SWITCHGEAR ASSEMBLIES—Assemblies of switchgear devices such as switches, interrupting devices, control, metering protective and regulating equipment with associated interconnections and supporting structures are covered in a proposed revised standard, A.I.E.E. No. 27A, "Switchgear Assembly Standards." Service conditions, definitions, ratings, heating, and dielectric tests are listed. These standards do not apply to industrial control equipment, communication switchboards and switching equipment, or switchboards for shipboard. Copy is available from American Institute of Electrical Engineers, 33 West 39th St., New York, N. Y.

INSULATOR TESTS—A manual of test procedures to be followed in making tests to determine the characteristics of insulators to be used on electric power systems is a proposed revised standard, A.I.E.E. No. 41A, "Insulator Tests," and is available from American Institute of Electrical Engineers, 33 West 39th St., New York, N. Y. Some items covered are: specimen mounting for electrical test; 60-cycle dry flashover test; 60-cycle wet flashover test; impulse testing procedure; mechanical strength tests, radio noise influence test, puncture and corona tests.

INFRA-RED FINISHES — Application of finishes to infra-red operations and the places where infra-red has proved practical and impractical as a finishing method is considered in a booklet "The Facts About Infra-Red," available from Ault & Wiborg Corp., 75 Varick St., New York, N. Y. Also included in a series of questions and answers on infra-red finishing problems.

NEWS ABOUT PEOPLE

C. E. Bathe of Oklahoma Made Engineering Head

C. E. Bathe, electrical engineer of the transmission-distribution department of the Oklahoma Gas & Electric Co. since 1936, was recently named as superintendent of engineering, succeeding the late Roscoe Schaeffer.

Mr. Bathe joined the then electrical department of the Oklahoma utility in 1927, coming from a position on the faculty of the University of Oklahoma engineering school. Shortly after joining the company, Mr. Bathe was appointed superintendent of the standards in charge of the electrical laboratory, a position he held for nine years, relinquishing it in 1936.

PERRY L. SHELLEY, formerly assistant to Mr. Bathe, succeeds him as electrical engineer of the transmission and distribution department. Mr. Shelley joined the Oklahoma Gas & Electric Co. in 1927. He has been a member of the transmission-distribution department since 1935.

•

▶ EDMUND C. STONE, vice-president and general manager of the Duquesne Light Co., has been appointed chairman of the Pittsburgh Defense Council to work under the National Civilian Defense Council created by President Roosevelt and headed by Mayor F. H. LaGuardia of New York. Two hundred prominent industrial manufacturers, military, educational and labor leaders in Pittsburgh were appointed to assist Mr. Stone.

▶ DR. JOSEPH SLEPIAN, associate director of the Westinghouse Research Laboratories, has been elected to the National Academy of Sciences. With more than 200 patents to his credit, Dr. Slepian is recognized as one of the country's outstanding engineers.

▶ WALTER H. ARRAS has been appointed general purchasing agent for the Philadelphia Co. and subsidiary companies, succeeding C. W. LEPPER, retired. Mr. Arras has been connected with the Philadelphia Co. since 1900. RUSSELL C. WENZ has been named assistant general purchasing agent, succeeding Mr. Arras.

▶ BRIG.-GEN. EDWARD C. ROSE has retired as a director and vice-president of three subsidiary companies of the Public Service Corp. of New Jersey because of Army duties. Although retiring from Public Service Electric & Gas Co., Public Service Co-ordinated Transport and Interstate Transportation Co., Gen. Rose will remain as director and vice-president of the corporation.

▶ DR. C. F. RASSWEILER, formerly director of the Philadelphia laboratory of E. I. duPont de Nemours Co., has been appointed director of research of the Johns-Manville Corp. In his new position Dr. Rassweiler will be a member of the officers board in charge of Johns-Manville's extensive research activities.

▶ JOSEPH BROUILLARD, assistant superintendent, has been appointed superintendent of the Farmington Valley division, Connecticut Power Co., with headquarters at Unionville, Conn., following 19 years' service with that utility. He succeeds the late Daniel C. Payne.

Delta-Star Announces Organization Changes

Announcement has been made by H. W. Young, president of the Delta-Star Electric Co., Chicago, of organization changes following the death of Elias S. Cornell, formerly chief engineer.

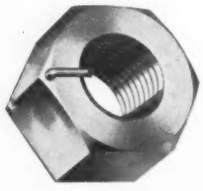
R. E. Anderson, formerly sales manager, becomes vice-president. C. S.

R. E. Anderson

C. S. Beattie

ANCO-NUTS
TIGHT *as a*
Scotch Pawnbroker

They are put on the bolt in the ordinary way, and with an ordinary wrench they can easily be removed without damage to either the nut or the bolt . . . Nut and lock are a single unit . . . No washers, pins or other separate parts to be mislaid and forgotten during the installation . . . Fool Proof—No matter how unskilled the labor . . . Comparable in price to the ordinary nut and lock washer, but incomparably more secure and efficient . . . They will prove indispensible where conditions of shock and vibration must be met, as vibration tends to tighten the locking—it can't unlock ANCO-NUTS.



ANCO-NUTS

fit any standard bolt and are furnished black or galvanized with U. S. S., S. A. E. or Whitworth threads as ordered. Write today for complete data and samples.

▲ ▲ ▲

Automatic Nut Company
LEBANON, PA.

Beattie, formerly assistant sales manager, has been made manager of engineering. W. O. Hampton, of the engineering department, becomes chief design engineer and S. C. Killian, of the engineering department, becomes development and research engineer. W. H. Boyce was made manager of industrial sales.

A graduate of the University of Michigan, class of 1913, Mr. Anderson entered the engineering department of the Eastern Michigan Power Co. After spending a year, 1914–15, with the Commonwealth Edison Co. of Chicago, he became identified with the H. M. Byllesby Co., engineering department, in 1916, and after military service in the World War, returned to Byllesby in 1919. From 1920–29 he served as sales engineer with Delta-Star; from 1929–36 as assistant sales manager and from that time, until his recent promotion, as sales manager.

Mr. Beattie, the new manager of engineering, became identified with the Westinghouse Electric & Manufacturing Co. at East Pittsburg following graduation from Rutgers University in 1923. Completing the testing and engineering courses, he entered the general engineering department. He became associated with the Public Service Production Co. in Newark in 1925 and then with the United Engineers & Constructors Co., Inc., when this company was organized, working in the switching station division. It was in 1930 that Mr. Beattie joined Delta-Star as sales engineer attached to the New York office and was transferred to Chicago, becoming assistant sales manager in 1936.

S. C. Killian entered the drafting department in 1923 and after spending six years with the company entered the University of Michigan in 1930. After receiving his degree in electrical engineering, he first became associated with a consulting engineering firm, and then rejoined Delta-Star in 1935. One year later he became head of development department.

W. O. Hampton joined Delta-Star in 1922 as engineering draftsman. He subsequently completed the electrical engineering course at Crane Technical College. Later he held various positions under chief engineer as head of air-break switch design division, standardization, patent department, etc., and in 1937 as assistant chief engineer.

•

▶ GEORGE I. COONS has been appointed Schenectady Works accountant of the General Electric Co. to succeed J. M. Howell, newly appointed works manager. Mr. Coons became identified with General Electric in 1924. He has been active in the National Association of Cost Accountants.

Promotions Announced by Hygrade Sylvania

The Hygrade Sylvania Corp., Salem, Mass., has appointed Dr. Rolland M. Zabel, formerly chief engineer, to the position of factory manager and head of engineering. Robert E. Barrett becomes superintendent of the incandescent lamp factory at Boston Street, Salem, and Henry F. Callahan has been named superintendent of fluorescent lamp production at this plant. Chester F. Horne has been made factory manager of the Miralume division and Ernest H. Powers plant superintendent at Ipswich, Mass. Russell Tirrell, safety engineer, was the recipient of a trophy recently at the Massachusetts Safety Conference in Boston, in recognition of a year's operation in the Miralume plant without a lost-time accident.

OBITUARY

Lorin E. Imlay

Lorin E. Imlay, statistical director for the Niagara-Hudson Power System until his retirement three years ago, died on June 9 at his home in Buffalo, after a long illness. He was 76 years of age.

Mr. Imlay received his technical education at Cornell College, Mount Vernon, Iowa, and at the University of California. He joined the Westinghouse Electric & Manufacturing Co. in 1894. From that time until 1902 he served Westinghouse as engineer in manufacturing, testing and installing electrical apparatus. During the last four years of this period he was located at Niagara Falls and installed seven of the original 5,000-hp. generators for the Niagara Falls Power Co., as well as much large capacity electrical apparatus in Buffalo and surrounding territory.

Mr. Imlay was connected with the Niagara Falls Power Co. from 1902-20, for three years as assistant superintendent and fifteen years as general superintendent. For one year, 1920-21, he was released by the utility for work with the Superpower Survey made under the direction of the U.S. Geological Survey. For the next three years he served as a consulting engineer for the power company, then in engineering capacities with the Buffalo, Niagara & Eastern Power Co. In 1927 he became statistical engineer for that organization, a position in which he remained until he retired in 1938. In 1930 he became the director of statistics for the Niagara Hudson System.

Mr. Imlay was a fellow of the American Institute of Electrical Engineers and a member of the Electrochemical Society.

▶ DANIEL C. PAYNE, superintendent of the Farmington Valley division of the Connecticut Power Co., with headquarters at Unionville, Conn., died on May 17 after 35 years with the company.

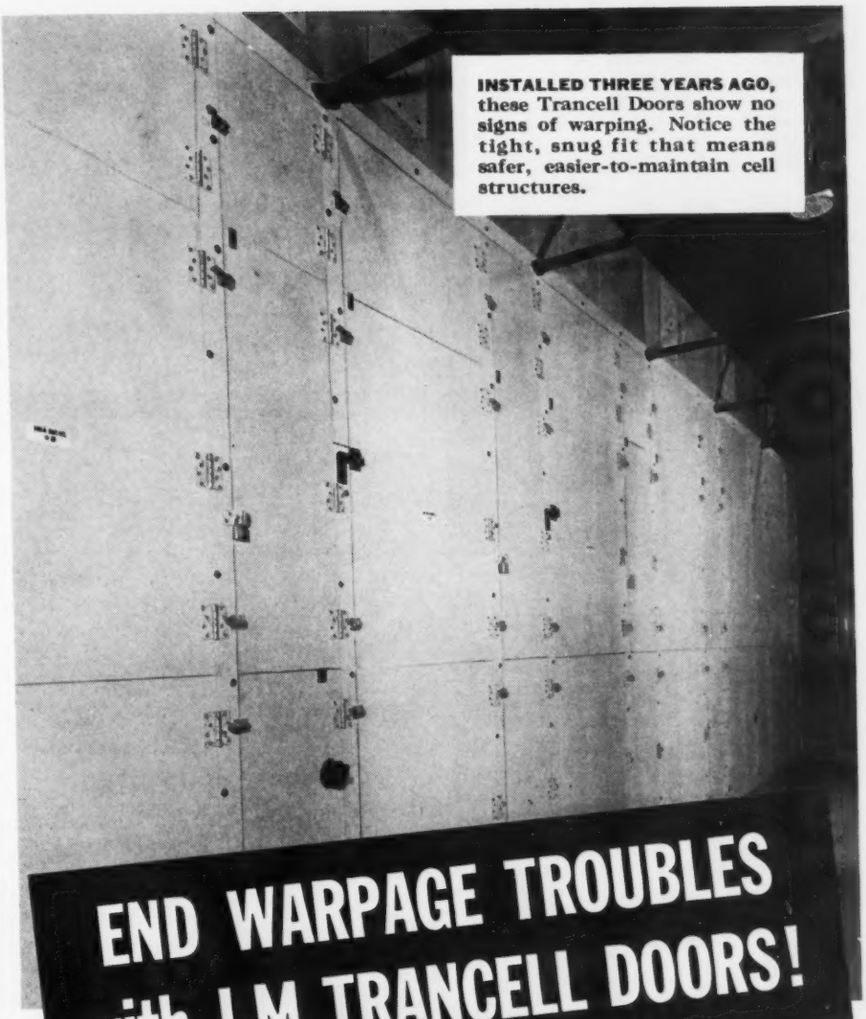
▶ FREDERICK W. BABB, 58, assistant engineer New England Power Service Co., Boston, died at Arlington, Mass., May 29. He was identified with right-of-way and municipal work on the New England Power System, coming to the organization about six years ago from the then Charles H. Tenney & Co. utility group, Boston.

▶ ROBERT M. PETERSON, assistant advertising manager of the American Steel & Wire Co., died suddenly on May 30 at Scottdale, Pa., where he was visiting relatives. Mr. Peterson was in his fifty-second year. He joined American Steel & Wire Co. in the sales promotion and advertising department in 1934.

▶ MCILVAIN M. WADE, assistant chief engineer of the Mill Street power plant of the Indianapolis Power & Light Co., died on May 15 in his Indianapolis home after a three months' illness. Mr. Wade was 57 years of age.

▶ FRANK L. DYER, biographer of Thomas A. Edison and himself an inventor of some note, died June 4 at his home in Ventnor, N. J., in his seventy-first year. Beginning his association with Mr. Edison as a patent attorney in his father's Washington office, Mr. Dyer moved to Orange in 1903 to become general counsel for all Edison interests. Mr. Dyer was co-author with T. Comerford Martin of a two-volume life of Edison, published in 1910 and revised in 1929. From 1914 until his retirement in 1929 he had headquarters in New York as a consultant on electrical and mechanical matters.

▶ JOHN F. MULLIGAN, general superintendent, electric distribution construction, Consolidated Edison Co. of New York, Inc., died February 6. He was born March 1, 1881, at Rock Tavern, N. Y., and entered the employ of the United Electric Light & Power Co., one of the predecessor companies of Consolidated Edison, in 1902. After serving in the cable bureau, in 1930 he became assistant superintendent of the transmission and distribution department of United and in 1933 supervisor of the transmission bureau of that and the New York Edison Co. He was appointed superintendent of transmission and distribution for New York Edison the same year, and continued in that position with Consolidated Edison until the beginning of 1941, when he became general superintendent of the electric distribution construction department.



INSTALLED THREE YEARS AGO, these Trancell Doors show no signs of warping. Notice the tight, snug fit that means safer, easier-to-maintain cell structures.

END WARPAGE TROUBLES with J-M TRANCELL DOORS!

NOT one of the thousands of Trancell Doors now in use has ever caused trouble due to warpage in service. That's because Trancell Doors are laminated in construction . . . made of asbestos-cement facings over a mineral core. And here's what warpage-resistance means in station safety and economy:

Dust stays out—Ordinary doors that warp badly permit infiltration of dust into cell structures. Because Trancell Doors help assure a *permanently* snug fit, this is minimized. Result: little or no danger of breakdowns caused by excessive dust in high-voltage equipment. And the nuisance and expense of shutdowns for frequent cleanings are eliminated.

Greater fire-protection—Trancell Doors are fireproof. And because they do not warp, they confine cell fires to the cell of origin . . . prevent station fires from damaging equipment.

Trancell Doors are light in weight, available with a complete line of hardware. For details, write for brochure DS-426. Johns-Manville, 22 East 40th Street, New York, N. Y.

JM PRODUCT

Johns-Manville TRANCELL

an asbestos product . . . for better cell structures and doors

MANUFACTURING - MARKETS

Copper and Steel Go Under OPM Control

Steel and copper were added last week to the list of metals now under mandatory control of the Office of Production Management and a maximum price schedule was put on scrap and secondary metals containing nickel by the Office of Price Administration and Civilian Supply.

Both the steel and copper orders are designed to give defense needs and essential civilian needs first call on all forms of these metals, according to the OPM. Supplementing the copper order, the first civilian allocation order was issued by Leon Henderson, OPAC's Administrator, which sets up standards under which civilian demands for copper are to be met after military requirements have been filled. One provision in this order stipulates that civilian industries which discriminate against defense orders will be unable to get copper supplies.

Under the provisions of the Priorities Order on copper, all copper refiners are required to pool each month an amount equal to 20 percent of their April production, which is to be kept available for defense needs.

•

Machinery Shipments Increase in April

Inventories and shipments of electrical machinery showed further increase during April, while new orders received were off somewhat, according to report of the Department of Commerce.

The index value of manufacturers' inventories in April was 164, as against 157.1 in March and 114.9 in April, 1940. The index value of shipments was 230 in April, 209 in March and 142 in April a year ago. The value of shipments hit a new all-time high. The value of new orders received was 289, against 296 in March and 131 in April, 1940.

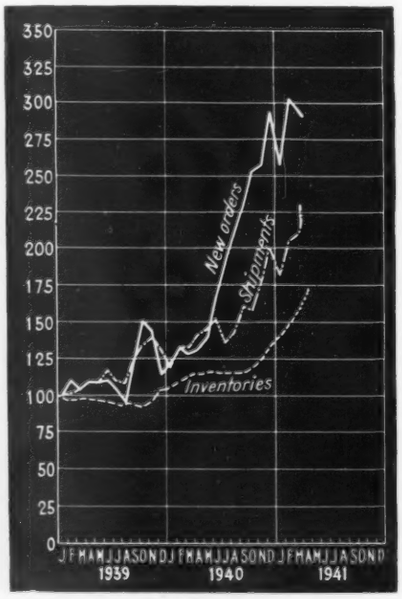
The percent change in value of manufacturers' unfilled orders in April showed an increase of 5 percent from March and was up 287 percent from April last year.

•

Plant Capacity Doubled by Paragon Electric

To take care of United States Navy contracts and a growing industrial demand for time control instruments, the Paragon Electric Co. has moved its manufacturing facilities from Manitowoc to Two Rivers, Wis.

In the new location the company will occupy a modern brick and concrete building having more than 25,000 sq.ft. of floor space—double the area of the former plant. Approximately 300 will be employed. Executive headquarters will remain in Chicago at 37 West Van Buren Street.



ELECTRICAL MACHINERY INDICES of Bureau of Foreign and Domestic Commerce

Good Year Forecast for Vacuum Cleaners

H. W. Burritt, president of the Eureka Vacuum Cleaner Co., in making public the company's quarterly statement, said that every known business barometer in the industry points to increased vacuum cleaner sales. Stating that Eureka's outlook for the current quarter is bright, he said the company has a substantial backlog of orders and that the current inventory condition is satisfactory.

For the quarter ended April 30 the company reported a net profit of $63,355, equivalent to 31 cents per share for 201,919 common shares. This is after all charges, including provision for income tax at current rates, and compares with a loss of $34,465 for the previous quarter of the fiscal year and a loss of $36,207 for the comparative period in 1940. Mr. Burritt pointed out that in each of the three months sales of the company's vacuum cleaners showed a marked increase over preceding months, reaching a new four-year high in April.

•

Line Material Moves Into New General Offices

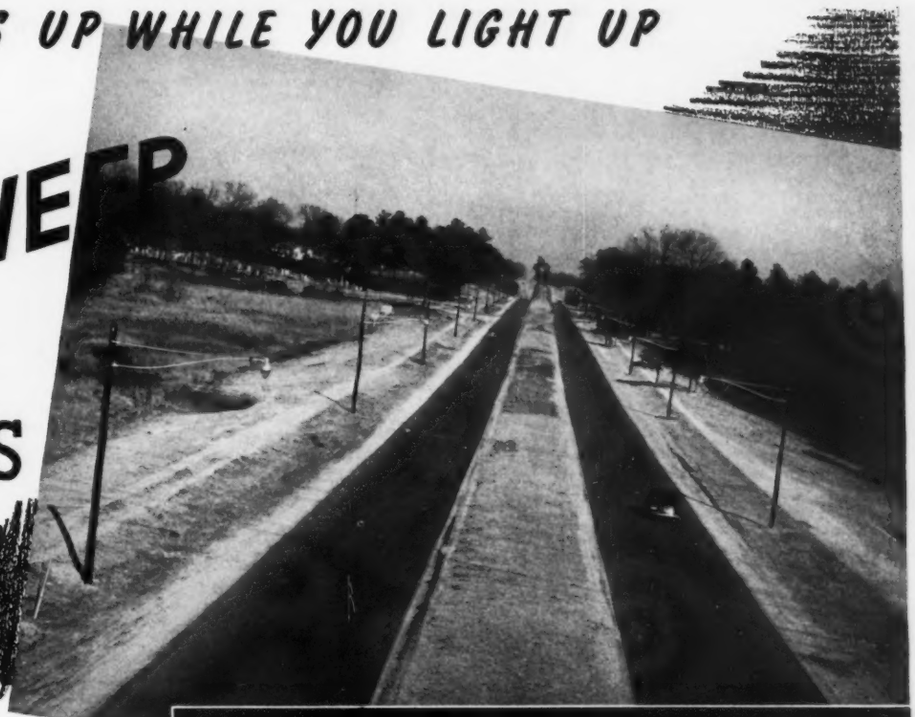
Administrative activities of Line Material Co. are now centered at 800 North Eighth Street, Milwaukee, Wis. The office building was purchased by the company in 1939 and completely remodeled and modernized.

New air-conditioning and humidifying system insures a complete change of air through the building every eight to ten minutes. Fluorescent lighting is used throughout, with special acoustical treatment of walls and ceiling to subdue office machine noises. Expansions of the company's main plant and research laboratories in South Milwaukee has absorbed the space formerly occupied by the general offices.

DRESS UP WHILE YOU LIGHT UP

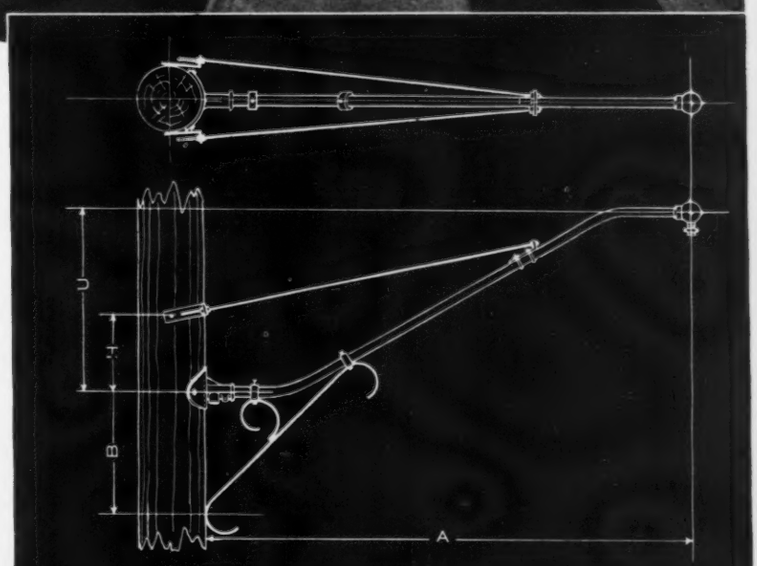
UTILITIES SERVICE

UPSWEEP MAST ARMS



"The longest lighted highway in the South", the new Birmingham - Bessemer, Alabama, Super Highway, is equipped with U-S UpSweep Mast Arms.

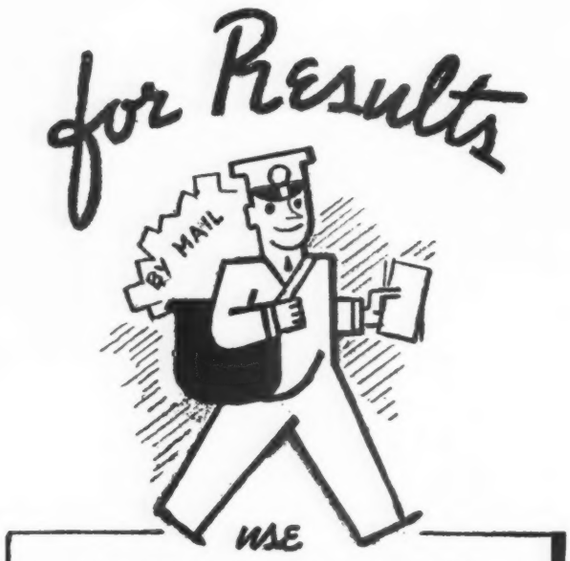
- **UpSweep Arms make it easy to obtain proper fixture mounting height above roadway.**
- **UpSweep Arms give greater road clearance without use of longer poles or permit use of shorter poles without reducing lamp height.**
- **UpSweep Arms are a low cost method of obtaining proper mounting height without disturbing existing power and communication circuits.**
- **UpSweep Arms are suitable for mounting on wood or steel poles with external or internal wiring.**
- **UpSweep Arms make it possible to obtain more light area without the necessity of increasing mounting distance from ground.**
- **UpSweep Arms afford a graceful means of mounting a lighting fixture, and are preferable from both the aesthetic and the engineering viewpoint.**



A Ft.	B In.	H In.	U In.	CATALOG NUMBERS Right Angle Bend	Straight End Not Threaded	Straight End Threaded	Street Ell	Spiked Ball
6	24	12	27	6U201- 4B10	6U241- 4B10	6U211- 4B10	6U221- 4B10	6U231- 4B10
8	24	15	36	8U201- 4B10	8U241- 4B10	8U211- 4B10	8U221- 4B10	8U231- 4B10
10	32	18	48	10U201- 6B10	10U241- 6B10	10U211- 6B10	10U221- 6B10	10U231- 6B10
12	32	21	57	12U201- 6B10	12U241- 6B10	12U211- 6B10	12U221- 6B10	12U231- 6B10
14	32	24	66	14U201- 6B10	14U241- 6B10	14U211- 6B10	14U221- 6B10	14U231- 6B10
16	42	24	75	16U201- 8B10	16U241- 8B10	16U211- 8B10	16U221- 8B10	16U231- 8B10
18	42	30	87	18U201- 8B10	18U241- 8B10	18U211- 8B10	18U221- 8B10	18U231- 8B10
20	42	36	96	20U201- 8B10	20U241- 8B10	20U211- 8B10	20U221- 8B10	20U231- 8B10
22	51	42	105	22U201-10B10	22U241-10B10	22U211-10B10	22U221-10B10	22U231-10B10
24	51	48	114	24U201-10B10	24U241-10B10	24U211-10B10	24U221-10B10	24U231-10B10

Dimensions readily altered to meet your specifications. Furnished with or without scroll brace.

UTILITIES SERVICE CO.
ALLENTOWN, PENNA.



As business paper publishers for over fifty years, McGraw-Hill is uniquely equipped to offer complete, authoritative direct mail coverage of industry's major markets. Extreme accuracy is maintained (guaranteed to 98%) and through careful analysis of markets, complete classification of companies and personnel, etc., the widest possible selections are available. Send for handy reference folder "Hundreds of Thousands of Reasons Why" which describes how McGraw-Hill Lists are built and maintained.

• What Fields Do You Want To Reach? •

Aviation Industry
Bus & Transit Industries
Business Executives
Chemical Process Industries
Civil Engineering & Construction
Coal Mining
Electrical Appliance Dealers
Electrical Contractors
Electrical Industry
Electrical Wholesalers
Food Industries
Manufacturing Industries
Metal Mining
Metal Working Industries
Mill Supply Distributors
Power Engineers
Product Engineers
Radio Engineers
Textile Industries

For further details, selections from above basic classifications, counts, prices, etc., or estimates on special lists . . . ask any representative or write to

DIRECT MAIL DIVISION

McGRAW-HILL PUBLISHING CO., INC.

330 W. 42nd St. NEW YORK, N. Y.

Manufacturers Make Sales Assignments

Corning Glass Works, Corning, N. Y., has announced that Waltham DeWitt & Krusi, 630-632 Monadnock Bldg., San Francisco, will represent it for the sale of insulators in the southern part of Oregon, northern part of California and the western part of Nevada. J. W. Fraser & Co., 124 Brevard Court, Charlotte, N. C., will represent it for the sale of insulators in the states of North Carolina and South Carolina.

Weston Electrical Instrument Corp. has appointed Edward S. Sievers as representative, located at 567 Subway Terminal Bldg., 417 So. Hill St., Los Angeles, Calif. John D. Farneman will be associated with Mr. Sievers in this territory. Mr. Sievers, who has been associated with Weston for many years, has been prominently identified with all phases of its business in Southern California since 1937.

Easy Washing Machine Corp. has appointed R. O. Fitzgerald as a district sales manager in charge of the newly established direct outlet territory comprising the counties of Delaware, Greene, Columbia, Sullivan, Ulster, Dutchess, Orange and Rockland in New York and Wayne and Pike counties in Pennslyvania.

•

Report Exports of Wire and Generator Sets

United States exports of d.c. generators during February totaled 125 units with a value of $68,113 and d.c. generators of 197 sets valued at $200,164, the Department of Commerce reports. Steam turbine generator sets totaled 23 under 500 kw. valued at $5,723 and nine of over 500 kw. with a value of $401,407.

Exports of rubber-covered wire totaled 983,869 lb. with a value of $78,444; insulated copper weatherproof wire totaled 391,094 lb. with a value of $105,094, and other insulated copper wire of 3,172,741 lb. and a value of $593,608.

•

Increase Floor Space

General Electric Co. will increase the floor space of its Schenectady works by about 850,000 sq.ft. this year. The present area is 6,500,000 sq.ft.

New York Metal Prices

	June 10, '41 Cents per Pound	June 4, '41 Cents per Pound
Copper electrolytic	12.00*	12.00*
Lead, A. S. & R. Price	5.85	5.85
Antimony	14.00	14.00
Nickel, Ingot	35.00	35.00
Zinc Spots	7.64	7.64
Tin, Straits	53.125	52.125
Aluminum, 99 per cent	17.00	17.00

* Delivery Connecticut Valley.

Field Reports on Business

Orders for industrial electrical equipment have featured markets of late. Utility buying continues on a good scale. Household appliances are in demand, but some curtailment is seen should priorities become more stringent. Defense orders are taking more of production capacity of manufacturers.

NEW YORK

Business in this area continues upward, with manufacturers reporting a steady stream of new orders. Production in all plants with defense contracts is expected to be lifted to top capacity with shifts broadened in answer to the speed-up call from Washington.

The E.E.I. convention in Buffalo had its moments—the great shock coming from SEC Chairman Eicher that disintegration of holding companies would be carried out to a conclusion. Utility executives reported increasing business and that construction programs were being speeded to meet anticipated increase in power loads. Drought conditions have not seriously affected this area, but low water is reported in some sections.

Electric appliance sales continue at a good pace. Higher refrigerator prices appear probable even after the second rise this season. Range sales in April by eighteen companies reported to N.E.M.A. were 65,692 units, against 43,303 a year ago. Big problem now is obtaining materials for production to meet demands.

Because of the increased demand for materials in the defense program, opinion is general that more stringent priorities will be in order soon. Some utilities are likely to be hard hit by priorities suggested for heavy fuel oil. Many companies changed plants to use oil as a hedge against a coal shortage.

Utilities are buying transformers, demand meters, network protectors, grounding reactors, switchgear and oil circuit breakers. Government orders include cable, rigid steel conduit, generators, resistance units, circuit breakers, switchboard, copper conductor, radio receivers and telephone equipment.

CHICAGO

Most lines of business in this area maintained the high level of activity that has extended over the past several weeks. A number of industrials are operating at capacity and with new orders coming in are seeking to expand manufacturing facilities or letting sub-contracts. Employment and payrolls advanced still further during May, a primary factor in the continued high rate of retail trade.

Utilities are pushing construction projects to meet increasing power demands. Manufacturers report no letdown in orders received for electrical equipment. The Merchandise Mart reports only a small portion of available business was booked by lamp manufacturers during April as production was limited by the shortage of metal parts and raw materials.

Recent electrical permits issued show an increase in the number of ranges installed. During a special four-month sale up to May 27, 366 employees of Commonwealth Edison Co. purchased ranges and water heaters. Twenty-two miles of fluorescent lighting tubes will be installed in the new Studebaker plants in Chicago, South Bend and Fort Wayne. Bids have been requested on four 400-amp., 40-volt arc-welding generators.

Defense orders for electrical equipment placed here in the last two weeks included couplings and fittings, $66,787; portable lamps, $13,268; electric furnaces, $77,504; oil circuit breakers, $32,791; telephone equipment, $122,172; wire and cable, $42,934; electric trucks, $10,569; portable drills, $47,872; generator sets, $25,058.

NEW ENGLAND

Industrial equipment orders featured the electrical market during the past week. Negotiations for marine needs were active and wiring supplies for new construction were strong. Small motor sales to machine tool manufacturers held steady; several groups of 5-hp. to 10-hp. motors for pumping and ventilating installations were sold by one manufacturer. Factory expansion continues and has a buoyant effect on buying electrical equipment and supplies. Stedfast Rubber Co., Mattapan, Mass., has installed 200 kva. in Sprague capacitors. An eastern Massachusetts machine shop has added 105 kw. in equipment; lighting installations ranging to 15 kw. and air-conditioning units averaging 10 hp. are typical electrical factory requisites in the present trend among the smaller plants.

Between May 1 and 15 New England orders placed by government bureaus for national defense amounted to $20,459,242, of which $12,704,007 went to Massachusetts, with the largest single award ($8,182,218) to General Electric.

Collyer Insulated Wire Co., Pawtucket, R. I., has been awarded a $362,518 electric cable order by the government. General Electric's athletic field, Lynn, has been equipped with 82 1,500-watt floodlights.

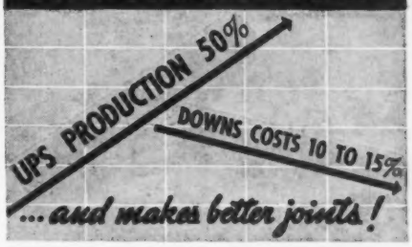
PACIFIC COAST

Pacific Coast stocks, especially of such key items as crossarms and 1-in. and over rigid iron conduit and fittings are depleted, with deliveries continually lengthening. Rubber and leaded wires are now being priced on basis of all-rail shipments. Several coast manufacturers, such as General Electric, are requesting that their customers' orders be specified as defense or non-defense, to aid their own raw material priorities. Coast transformer factories are working at capacity.

Much fluorescent relighting has been planned, and the 49-foot-candle and over installation drive, commencing spectacularly in the old 1849 mining region, will be continued all year as a salesmen's contest. The 600 homes for personnel of the Alameda Naval Base will be equipped with electric ranges. A northern California campaign during June and July will be especially aimed at 35,000 electric range users, who do not own electric water heaters.

California has projected a $66,000,000 ten-year state building program to begin July 1, 1943, following prospective peak of the National Defense program. Pacific Gas & Electric Co. has contracted to supply a temporary 8,000 hp. to the Los Altos 12,000-ton magnesium plant, with 100,000 hp. additional, at a construction cost of $500,000, to be furnished after the experimental period.

Sil-Fos BRAZING on electrical work



THAT'S what SIL-FOS is doing for the manufacturer of the electrical equipment shown below. Here are the reasons for the speed, reliability and economy SIL-FOS is giving.

FREE-FLOWING

SIL-FOS's instant penetration to all parts of a joint assures **high strength** and a **solidly brazed** joint for carrying current—and increases brazing speed.

SILVER CONTENT—

gives ductility that withstands vibration, shock, temperature changes; also high electrical conductivity. SIL-FOS brazing is your best insurance against joint troubles in service.

LOW WORKING TEMPERATURE

(1300 Deg. F.) still further increases brazing speed, saves gases or other heat and protects metals—particularly thin sections — against damage from over heating.

BULLETIN EW-5

gives SIL-FOS features and advantages in detail. Write for a copy—then test the speed, reliability and economy SIL-FOS offers, on a non-ferrous job in your plant.

SIL-FOS brazing joins several reels of copper wire required in winding this electro-magnet.

SIL-FOS also joins connections to windings of the magnet coils. The incandescent carbon heating tongs make it easy to heat and apply pressure, assuring soundly brazed joints.

APPROVED
SIL-FOS is included in Navy, Federal and other specifications and is used on a wide variety of government work.

HANDY AND HARMAN
HANDY & HARMAN FOUNDED 1867 QUALITY SERVICE
82 Fulton St.
New York, N. Y.
Agents in Principal Cities
HANDY & HARMAN of Canada, Ltd., Toronto

VITAL

-keeping your lines

GOING!

TRANSMISSION line breaks or crippling "shorts" *can* cost you more than a whole year's scientific tree-trimming!

Expert tree-trimming costs little — saves much. It keeps trees blameless in power failures. It removes *one* risk of sabotage from national defense—and an important one, mind you. Better look into this—now.

●

NATIONAL DEFENSE DEMANDS

uninterrupted Power

ASPLUNDH
TREE EXPERT COMPANY

HOME OFFICE—JENKINTOWN, PA., Ogontz 3750

CHICAGO, ILL. Randolph, 7773
PITTSBURGH, PA. Atlantic 9798
BINGHAMTON, N. Y. Binghamton 4-5314
WASHINGTON, D. C. Shepherd 5249
COLUMBUS, OHIO Adams 5432
OMAHA, NEB. Atlantic 8305
ALEXANDRIA, VA. Alexandria 3581
BALTIMORE, MD. Glenburnie 790J
NEW CASTLE, PA. New Castle, 2285
CAMBRIDGE, MASS. Kirkland 5330
RUTHERFORD, N. J. Rutherford 2-7434
DURHAM, N. C. Durham, X5544

UTILITY CONTRACTS EXCLUSIVELY

Here's America's *he-man* tree—the proud white oak. Highly useful commercially.

Highly destructive electrically. But we can save your lines — and the white oaks, too.

Sales Opportunities

NORRIS, TENN.—Tennessee Valley Authority, Knoxville, Tenn., has plans under way for new 154,000-volt transmission line from Norris dam hydroelectric power station to Pineville, Ky., and Hazard, Ky., where connection will be made with high-tension systems of Kentucky Utilities Co. and Kentucky and West Virginia Power Co., respectively, for interchange of power. Terminal switching stations will be located at two points noted. Proposed to begin work soon.

GARFIELD, N. J.—Heyden Chemical Corp., Garfield, manufacturer of acids, bromides and other chemical products, plans new power plant for service at works. Cost estimated about $300,000, with equipment. Company also will install motors and controls, switchgear, duct lines, regulators, conveyors and other equipment in connection with expansion in chemical plant for increased capacity, to cost approximately $800,000. Financing for projects is being arranged through sale of a preferred stock issue totaling about $2,000,000.

LA PLATA, MD.—Southern Maryland Tri-County Cooperative Association, Inc., La Plata, plans expansion in electric generating station used for power supply for rural system, including installation of new generator unit and auxiliary equipment. Line extensions also will be made.

CINCINNATI, OHIO—United States Engineer Office, Federal Building, Cincinnati, receives bids (no closing date stated) for four electric-operated pumping stations, complete with pumping units, electrical and mechanical equipment (Circular 114).

WILLIAMSBURG, PA.—Pennsylvania Edison Co., Altoona, Pa., has plans maturing for proposed extensions in steam-electric power plant at Williamsburg, forming part of 1941 expansion and improvement program, and will proceed with work at early date. New turbine-generating unit, high-pressure boiler and auxiliary equipment will be installed, with enlargement of switchyard and extensions in transmission lines. Entire project is reported to cost over $2,500,000. Burns & Roe, Inc., 233 Broadway, New York, N. Y., is consulting engineer.

SHREVEPORT, LA.—Southwestern Gas & Electric Co., Shreveport, has plans in progress for extensions in transmission lines in northern Texas to connection with high-tension system of Texas Power & Light Co., Dallas, Tex., for interchange of power. Terminal switching station will be built at point now being determined. Similar expansion will be carried out in transmission system in northwestern area for like connection with transmission lines of Public Service Co. of Oklahoma, Tulsa.

BATON ROUGE, LA.—Standard Oil Co. of Louisiana, Inc., New Orleans, La., plans installation of motors and controls, duct lines, switchgear, transformers and accessories, electric-operated pumping machinery, motor-generator sets, conveyors, industrial lighting systems and other equipment in new additions at site of main oil refinery at Baton Rouge, comprising four main plant divisions, each consisting of several large buildings. These will include two groups for synthetic rubber manufacture, chemical plant for production of solvents, alcohols, etc., and a final group for raw material production for other plants mentioned. Power plant will be enlarged. Entire project will cost over $12,000,000. Work is scheduled to begin soon.

ST. GEORGE, S. I., N. Y.—Staten Island Edison Corp., St. George, plans extensions in distributing lines in several districts, with service facilities for additional consumers.

JACKSONVILLE, FLA.—Board of City Commissioners has plans for expansion in main municipal steam-electric generating station, primarily for extensions in steam division, with installation to include high-pressure boilers and auxiliary equipment. Cost estimated at $2,000,000. Of this amount, it is proposed to arrange for a Federal fund of about $900,000. Work will begin as soon as financing has been completed.

DETROIT, MICH.—Detroit Edison Co. has secured power contracts for service at number of new industrial plants now being constructed in company territory for munition production for Government, and will make line extensions and construct power substations on plant sites for this purpose. These include plant of Kelsey-Hayes Wheel Co. at Plymouth; Hudson Motor Car Co. in Wayne Township; Bendix Aviation Corp., Wayne; King-Seeley Corp., Ann Arbor, and others, including installations now under way.

CLINTON, IND.—Public Service Co. of Indiana, La Fayette, Ind., has approved plans for new transmission line from generating station at Clinton to La Fayette, over 70 miles, for increased service in latter area for industrial plants. Power substation at La Fayette will be enlarged. Work will be carried out by company forces.

JAMESTOWN, KY.—United States Engineer Office, Nashville, Tenn., receives bids until June 27 for construction of Wolf Creek power dam in Russell County, Ky., on site on Cumberland River, about 10 miles from Jamestown (Circular 129). This is a new Federal project for hydroelectric power development with ultimate cost estimated at $55,000,000.

NEWBERRY, MICH.—City Council has plans under way for extensions and improvements in municipal power plant, including installation of additional equipment, for which fund of $60,000 recently was authorized. Proposed to begin work soon.

WICHITA, KAN.—Boeing Airplane Co., Seattle, Wash., plans installation of motors and controls, motor-generator sets, switchgear, power substation and equipment, duct lines, industrial lighting system, electric hoists, conveyors and other equipment in new multi-unit plant at Wichita, for production of bomber aircraft for government. Cost estimated about $17,500,000 and fund in that amount will be secured through Defense Plant Corporation, Washington, D. C., a Federal agency.

MOBILE, ALA.—Alabama Power Co., Birmingham, Ala., has approved plans for steel frame superstructure for addition to Chickasaw steam-electric generating plant, near Mobile, previously noted in these columns, and will begin work soon. Capacity of station will be increased. This is part of 1941 expansion program of company.

Quebec Moves Toward Beauharnois Acquisition

The Quebec Legislative Assembly rejected by a 48 to 11 vote an Opposition motion urging the House to shelve for six months a bill which would allow the government to expropriate the Beauharnois Light, Heat & Power Co. The vote was taken after Premier Godbout said that "it is urgent for the legislation to be passed, because it is needed to speed the war effort and for the after-war period. . ."

Opposition Leader Maurice Du Plessis said: "We are not ready to study this question. It is a question which involves the spending by the province of some $100,000,000 of the people's money. Have we the means to do that? Those who delay the war effort are those who engage the country and the province in ruinous, costly projects."

•

Increase in Net Profit Reported by Rome Cable

Rome Cable Corp., in its report for the fiscal year ended March 31, 1941, shows net profit of $385,460 after depreciation, interest, federal income and excess profits taxes and reserve of $40,000 against future price decline in copper. Above net is equal to $2.03 a share (par $5) on 189,830 shares of capital stock.

This compares with net profit in preceding year of $288,813 or $1.52 a share, after reserve of $8,924 against price decline in copper.

•

Sell Subsidiary Holding

North American Co. has sold $954,500 principal amount of Illinois Power & Light Co. bonds, representing the former's entire holdings in those issues to the Northwestern Mutual Life Insurance Co. Total proceeds of $1,022,078 from the bond sales will be used to retire North American Co. debt along with other funds in the treasury.

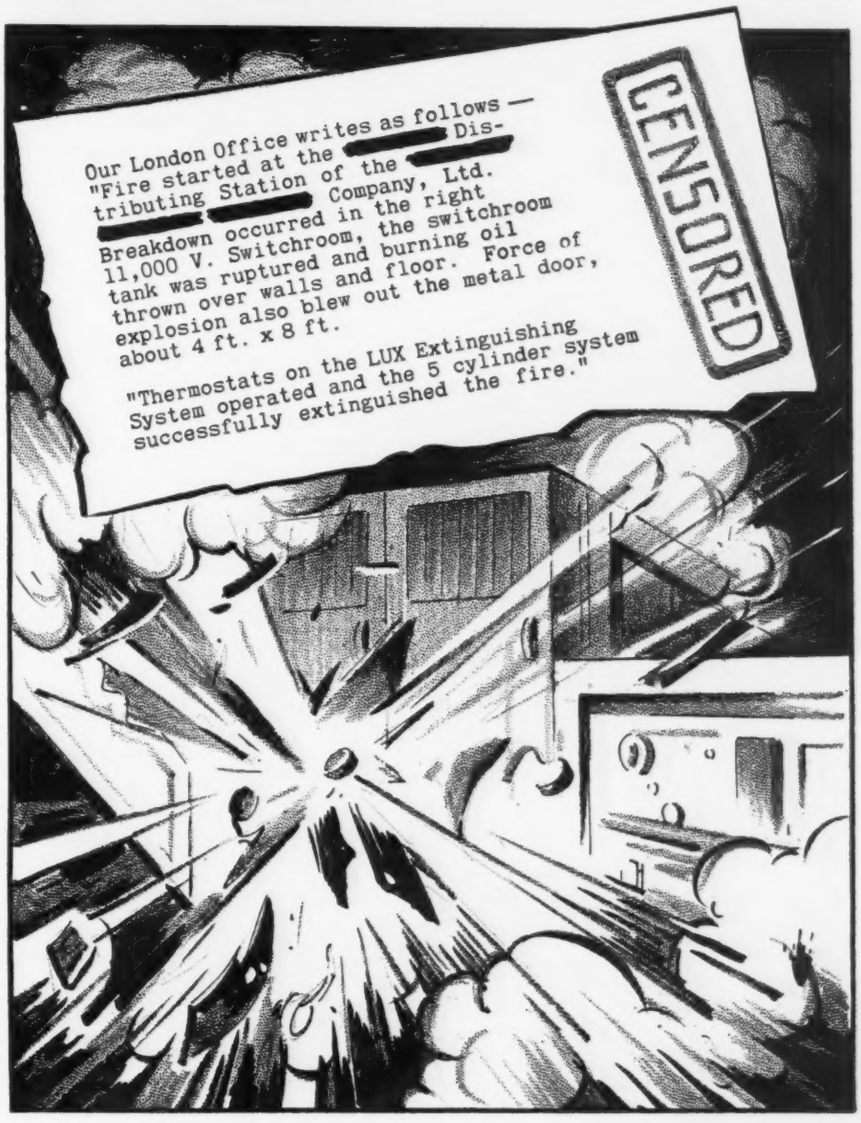
•

Builds Plant Addition

Allis-Chalmers Manufacturing Co., Inc., West Allis, Wis., is continuing expansion at its plant and has completed plans for a new two-story addition, 145 x 224 feet, on South Seventieth Street, reported to cost more than $300,000, with equipment. Bids have been asked on general erection contract and award is scheduled to be made soon.

DID A SABOTEUR START THIS FIRE?

...A REPORT FROM ENGLAND


CENSORED
Our London Office writes as follows —
"Fire started at the [redacted] Distributing Station of the [redacted]
[redacted] Company, Ltd.
Breakdown occurred in the right 11,000 V. Switchroom, the switchroom tank was ruptured and burning oil thrown over walls and floor. Force of explosion also blew out the metal door, about 4 ft. x 8 ft.
"Thermostats on the LUX Extinguishing System operated and the 5 cylinder system successfully extinguished the fire."

In a few short months, American fire protection practice has changed sharply. In addition to accidental fires, we now have the sinister threat of the planned fires of saboteurs. Get ready.

Most reliable is completely automatic protection of switch rooms, transformers, generators, frequency changers, etc. LUX Built-in Systems guard these installations with greater assurance of safety, especially in unattended stations.

LUX carbon dioxide gas is a lightning-fast fire-killer. Automatically actuated LUX Systems get fire out so rapidly that outage is kept to a minimum, and maintenance at a low figure. Get LUX Built-in protection promptly.

LUX

Walter Kidde & Company
INCORPORATED
628 West Street, Bloomfield, N. J.

NEW THE IMPROVED CHICAGO GRIP FOR HOT OR DEAD LINES

"Since 1857"

SLIP this grip on the line — the safety latch holds it fast. It can be applied close to the pole and slid out the required distance—and it can't fall off accidentally.

The harder the pull — the tighter it holds. The Improved Chicago Grip is ideal for Hot Lines, too, giving the maximum in safety plus the maximum in convenience.

A copy of this new folder will be sent on request. Write for Bulletin 3141.

ASK YOUR SUPPLIER

Foreign Distributor:

International Standard Electric Corp., New York

Mathias KLEIN & Sons

3200 Belmont Avenue, Chicago, Illinois

REA Allots $50,000; Contracts Approved

Rural Electrification Administration has allotted $50,000 to expand existing REA-financed facilities in the Virgin Islands. The borrower is the Virgin Island Co., at Christiansted, St. Croix, Virgin Islands, a Government corporation, which is already operating a generating and distribution system built with REA loans totalling $150,000.

This allotment brings the total made by REA since it was established in 1935 to $367,744,121, of which $97,404,509 represents operations of the current fiscal year.

Among the construction contracts approved between April 24 and May 26 are the following:

ARKANSAS—Craighead Electric Co-operative Corp., Jonesboro, T. J. Robertson, manager and Ray W. Chanaberry, Inc., 1000 Realty Building, Louisville, Ky., engineer, contract to L. O. Brayton & Co., Dyersburg, Tenn., 244 miles of line, 608 members; bid, $156,016.

COLORADO—Yampa Valley Electric Assn., Inc., Steamboat Springs, Clifford G. Hanson, supt., and Walter E. Flora, Cheyenne, Wyo., engineer, contract to Snyder and Johnson, Inc., Humboldt, Iowa, 178 miles of line, 268 members; bid, $99,080.

GEORGIA—Satilla Rural Electric Membership Corp., Alma, Valene Bennett, acting superintendent, and Marcus C. Long, 3419 North Main St., Columbia, S. C., engineer, contract to Stuart C. Irby, Jackson, Miss., 185 miles of line, 446 members; bid, $103,871.

IDAHO—Prairie Power Co-operative, Inc., Fairfield, Eddie J. Williams, supt., and H. S. Nixon, 219 Omaha Grain Exchange Bldg., Omaha, Nebr., engineer, contract to National Construction Co., P.O. Box 1392, Rapid City, S. D., 119 miles of line, 150 members; bid, $62,348.

ILLINOIS—Southwestern Electric Co-operative, Inc., Greenville, Victor Kallal, supt. and Rural Line Engineers, Clayton, Mo., engineer, contract to Street Lighting Service Co., 59 West Marquette road, Chicago, 200 miles of line, 401 members; bid, $152,264.

IOWA—Eastern Iowa Light & Power Co-operative, 214 West Fourth St., Davenport, S. N. Jordan, supt., and K. R. Brown, 802 Valley Bank Bldg., Des Moines, Iowa, engineer, 394 miles of line, 723 members; bid, $281,727.

KANSAS—Central Kansas Electric Co-operative Assn., Inc., Great Bend, William J. Groh, supt. and A. W. Hefling, 8½ East 2nd St., Hutchinson, Kansas, engineer, contract to R. E. Mattison & Co., Britton, Okla., 312 miles of line, 516 members; bid, $173,706.

KENTUCKY—Harrison County Rural Electric Co-operative Corp., 115 East Pike St., Cynthiana, G. L. Bridwell, supt., and Ray W. Chanaberry, 1000 Realty Bldg., Louisville, engineer, contract to Shely Construction Co., P.O. Box 398, Lexington, Ky., 70 miles, 154 members; bid, $40,591.

LOUISIANA—Dixie Electric Membership Corp., Baton Rouge, E. B. Thompson, manager, and H. B. Gieb, 1207 Texas Bank Bldg., Dallas, Tex., engineer, contract to L. O. Brayton & Co., Dyersburg, Tenn., 212 miles of line, 388 members; bid, $116,164.

MARYLAND—Choptank Co-operative, Inc., Denton, C. A. Sennett, supt., and B. O. Vannort, 803 Commercial Bank Bldg., Charlotte, N. C., engineer, contract to Day & Zimmermann, Inc., 620 Packard Bldg., Philadelphia, 678 miles of line, 1460 members; bid, $488,107.

MICHIGAN—Ontonagon County Rural Electrification Assn., Ontonagon, Cyril Clark, supt., and J. & G. Daverman Co., 44 Porter Block, Grand Rapids, Mich., engineer, contract to Nicholas M. Isabella, 2245 Eton Ridge, Madison, Wis., 80 miles of line, 158 members; bid, $52,106.

MISSISSIPPI—Coast Electric Power Assn., 154 Main St., Bay St. Louis, C. Clifton Ferrell, supt., and J. R. Rollins, Bay St. Louis, Miss., engineer, contract to Delta Construction Co., Clarksdale, Miss., 95 miles of line, 330 members; bid, $59,413.

MONTANA—Sun River Electric Co-operative, Inc., Fairfield, R. C. Sherman, supt., and John W. Hall, Fort Shaw, Montana, engineer, contract to D. M. Manning, Hysham, Mont., 178 miles of line, 300 members; bid, $106,308.

NEW HAMPSHIRE—New Hampshire Electric Co-operative, Inc., 14 Main St., Plymouth, Leon M. Huntress, supt., and J. R. Worcester & Co., 79 Milk St., Boston, Mass., engineer, contract to Donovan Contracting Co., 1725 Carroll Ave., St. Paul, Minn., 106 miles of line, 240 members; bid, $91,496.

NORTH CAROLINA—Burke-McDowell Electric Membership Corp., Morganton, William E. Wortman, supt., and B. O. Vannort, 1207 Commercial Bank Bldg., Charlotte, N. C., engineer, contract to Day & Zimmermann, Inc., 620 Packard Bldg., Philadelphia, Pa., 191 miles of line, 700 members; bid, $141,880.

NORTH DAKOTA—Cass County Electric Co-operative, Inc., Kindred, A. J. Tuskind, manager, and M. S. Hyland, 1114 Eighth Ave., North, Fargo, N. D., engineer, contract to Zontelli Bros., Ironton, Minn., 295 miles of line, 389 members; bid, $153,781.

OHIO—Adams Rural Electric Co-operative, Inc., West Union, H. F. Miller, supt. and Putnam & Woolpert, 132 North Main St., Dayton, Ohio, engineer, contract to Paul L. Gilmore Co., 395 East Broad St., Columbus, Ohio, 248 miles of line, 526 members; bid, $167,747.

OKLAHOMA—Cimarron Electric Co-operative, 217½ North Main St., Kingfisher, Roy Boecher, manager, and S. B. Wadley, Box 18, Kingfisher, Okla., engineer, contract to A. J. Pharaoh, Henryetta, Okla., 240 miles of line, 369 members; bid, $133,016.

OREGON—Coos Electric Co-operative, Inc., Coquille, R. J. Connarn, supt., and John W. Cunningham & Associates, 414 Spalding Bldg., Portland, Ore., engineer, contract to Hagen & MacClintic, P.O. Box 1506, Pueblo, Colo., 96 miles of line, 203 members; bid, $73,909.

SOUTH CAROLINA—Berkeley Electric Co-operative, Inc., Moncks Corner, S. C., B. E. Hatfield, supt., and J. B. McCrary Engineering Corp., 1408-22 Marietta Street Bldg., Atlanta, Ga., engineer, contract to Ivy H. Smith Co., 1525 San Marco Boulevard, Jacksonville, Fla., 116 miles of line, 293 members; bid, $83,647.

TENNESSEE—Fort Loudoun Electric Co-operative, Madisonville, J. F. Llewellyn, president and J. B. McCrary Engineering Corp., 1408-22 Marietta Street Bldg., Atlanta, Ga., engineer, contract to L. O. Brayton & Co., Byersburg, Tenn., 243 miles of line, 754 members; bid, $169,550.

TEXAS—Fannin County Electric Co-operative, Inc., Box 98, Bonham, Alozo Chaffin, supt., and Freese and Nichols, 407 Capps Bldg., Fort Worth, Tex., engineer, contract to Williams & Broughton, Inc., 5422 Mockingbird Lane, Dallas, Tex., 234 miles of line, 461 members; bid, $112,968.

Recent Rate Changes

DANBURY AND BETHEL GAS & ELECTRIC CO. established electric rate reductions June 1, which will save consumers $65,000 annually. The Connecticut commission has approved the new tariff.

IOWA-NEBRASKA LIGHT & POWER CO. has announced a reduction in electric rates for all consumers in all towns served by the company. The new rates will become effective on July 1 bills. The overall cost of reduction to the company per year on residential and commercial consumers is reported to be $60,000.

EASTERN SHORE PUBLIC SERVICE CO. and its affiliated Maryland Light & Power Co. have filed with the Maryland Public Service Commission the new rate schedules which effect an estimated $100,000 a year for customers (ELECTRICAL WORLD, May 17, page 110).

PORTLAND GENERAL ELECTRIC CO., Portland, Ore., inaugurated on May 22 the new rate making policy which abandoned the old "postage stamp" theory of uniformity throughout the company territory and embraces a theory of basing rates on the varying costs of service in different localities. On that date the company filed three separate residential and commercial tariffs for all incorporated cities in Marion and Polk counties, Ore. The new tariff adopts the Bonneville objective rate as a standard and applies different "locality surcharges" to different cities and towns. Salem, largest city in the area affected, and capital of the state, receives Bonneville objective rate plus 5 per cent surcharge. Four other towns in the vicinity of Salem have a 10 per cent surcharge added to the Bonneville rate and the other incorporated cities in the two counties take a 15 per cent surcharge. The rural areas in the two counties retain the old rate. The Bonneville objective rate is 50 kw.-hr. at 3 cents; 50 at 2 cents; 200 at 1 cent; 900 at ½ cent; and over 1,200 at ¾ cent. The three commercial schedules filed at the same time applied the same surcharges to the Bonneville objective commercial rate which starts at 150 kw.-hr. at 3 cents and drops to 0.03 cent for excess above 100,000 in six steps. Explaining this rate policy, James H. Polhemus, president, stated that it was the policy applied by PUDs and municipalities distributing Bonneville power which vary with conditions in each locality. The company policy followed a study made of the area under consideration by Prof. F. O. McMillan, head of the department of electrical engineering, Oregon State College, during the summer of 1940. Mr. Polhemus states Professor McMillan will continue these studies in other parts of the company territory with a view to applying the same policy in those areas, which includes Multnomah, Clackamas, Yamhill and Washington counties. The new rates place the cities in Marion and Polk counties below the rates in Portland where, Mr. Polhemus stated, underground distribution and other factors tend to produce higher costs than obtain in many of the smaller cities.

ARKANSAS POWER & LIGHT CO. will put into effect on September 1 a minimum annual rate reduction of $300,000 for commercial customers. The Arkansas Public Utilities Commission issued the announcement after a conference had delayed a scheduled hearing on a show-cause order why the company should not institute an immediate $350,000 rate cut. The schedules will cover "all except the domestic, rural and big power consumers." New schedules will contain a tax clause to provide that the rates shall be subject to an increase

NEW!

Complete Insulating Varnish Manual

HERE it is! A new 34 page manual on Insulating Varnishes, printed in color and illustrated with 38 pictures and charts. It describes 31 different insulating varnishes, paints and enamels; explains characteristics, uses, applications and types; contains useful tables and information; and is fully cross-indexed for quick reference.

Pioneering in the development and manufacture of insulating varnishes since 1905, and continuous research in insulation applications, makes Irvington the logical source for information on insulating varnish practice.

Send for your copy at once—no obligation except to write Dep't. 46, or fill in and return the coupon below.

IRVINGTON VARNISH & INSULATOR CO.
IRVINGTON, NEW JERSEY, U. S. A.
PLANTS AT IRVINGTON, N. J. and HAMILTON, ONT., CAN.
Representatives in 20 Principal Cities

Irvington Varnish & Insulator Co.,
Department 46.
Irvington, N. J.
Send me the new Insulation Varnish Manual

Name .....
Position .....
Company Name .....
Address .....
City .....

It does the WORK of 50 MEN at a Fraction of the Cost

Autocall
AC NETWORK SUPERVISORY SYSTEMS

Here is sixty second a minute vigilance which will do the work of watchmen stationed at every vital operating point . . . and do it more efficiently because the AUTOCALL AC NETWORK SUPERVISORY SYSTEM is automatic, fool-proof, forever dependable. If you are interested in continuity of power service . . . maximum economy . . . a proven and practical system of power control . . . investigate.

SINCE 1908
SPECIALISTS IN SIGNALLING AND CONTROL EQUIPMENT

Check equipment in which you are interested . . . attach list to business stationery for complete data.

- ☐ A. C. Network Supervisory Systems
- ☐ Power Plant Supervisory Systems
- ☐ Oil Filled Cable Supervisory Systems
- ☐ Supervisory Control Systems
- ☐ Electronic Signalling Equipment
- ☐ Diagram Boards ☐ Recording Ammeters
- ☐ Special Lamp Annunciators
- ☐ Special Control Systems ☐ Paging Systems
- ☐ Relays, Special Devices & Liquid Flow Indicators
- ☐ Special Steel Cabinets, Bench Boards and Panels

A complete staff of electrical and mechanical engineers and physicists, available for special designs to meet individual problems.

The AUTOCALL COMPANY
409 PARK AVENUE
SHELBY, OHIO

or decrease in proportion to the amount of new or increased taxes which the company "may hereafter have to pay" as a result of laws not in effect on June 1, 1941. The tax clause will apply to all of the rate schedules of the company. A joint memorandum said the commission and company will use "every effort" to establish a rate base not later than January 1, 1942, and "as of June 30, 1941." A general investigation of Arkansas Power & Light operations, started in 1937, is being made in connection with establishing a base.

MOUNTAIN STATES POWER CO. has filed with the Oregon Utilities Commission a new rate tariff, effecting savings aggregating $98,000 annually to the 23,000 customers of the company. The new rates became effective June 1. Residential, commercial, and street-lighting rates were included in the reductions. The new rates involve the entire Willamette Valley division.

•

Municipal Plants

LEBANON, IND.—The city was granted authority to buy the electric utility from the Public Service Co. of Indiana in a recent opinion by the Indiana Supreme Court. The utility company, in an appeal from Boone County Circuit Court, charged error in the amount of damages resulting from condemnation proceeding brought by the city. In upholding a verdict of the lower court, the supreme court also denied the company's contention it should be paid for its franchise and upheld the city's right to buy the Public Service Co.'s electric utility property for $210,000.

GRUNDY CENTER, IOWA—By a three to one vote in a recent special election the citizens authorized the city council to buy the Northwestern Light & Power plant for $190,000. They also favored a bond issue for $200,000, the additional $10,000 to take care of additional immediate street lighting improvements.

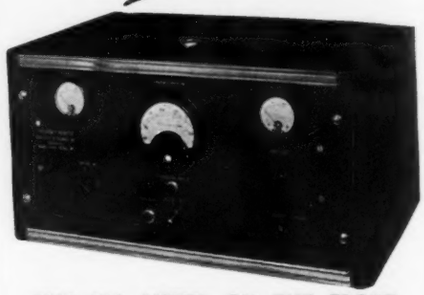
PAULLINA, IOWA—Proposal to erect an $85,000 municipal electric light and power plant was defeated by the citizens in a recent special election.

AUDUBON, IOWA—Proposal to erect a municipal electric plant was defeated by the voters in a special election held May 16.

CRISFIELD, MD.—Selection of Perring & Remington, engineers of Baltimore, Md., and Camden, N. J., to make the necessary studies, surveys and investigations incident and appropriate to the construction and establishment of a municipal electric light and power system has been approved by the state Public Service Commission. An unusual feature of a law passed at the last session of the General Assembly authorizing the construction of the system and also authorizing a $500,000 bond issue, was a provision that the selection of the engineers to make the necessary surveys by the Mayor and Council of Crisfield, be approved by the Public Service Commission.

ST. GEORGE, UTAH—Citizens have voted 952 to 287 in favor of construction of a municipal power plant, after an intensive campaign. The vote obviated the necessity for an election scheduled for May 29, at which time the Southern Utah Power Co.'s request for a renewal of its 25-year franchise for another fifteen years was to have been voted on. The power company's franchise will expire October 1, 1941. The city plan calls for issuance of a $300,000 bond issue to construct a power plant to supply the city, utilizing both Diesel and hydroelectric power units.

A DIRECT READING FREQUENCY MONITOR, MODEL FD-8
BY
Doolittle



THE BIG METER ON THE FRONT GIVES THE FREQUENCY DEVIATION WITHOUT INVOLVED CALCULATION.

- Monitors Fixed and Mobile Transmitters
- Provides Direct Reading of Frequency Deviation
- Monitors Four Frequencies
- Temperature Controlled Crystal Chamber
- Accuracy of the Monitoring Frequency is .002%
- Operates on any Frequency—1500 to 50,000 KC.
- Three Ranges of Measurements

Literature and Prices Sent on Request.

DOOLITTLE RADIO, INC.
7421 LOOMIS BLVD. CHICAGO, ILL.

DANGER
HIGH VOLTAGE
KEEP AWAY!

This sign becomes effective only when property is protected by a Stewart Non-Climable Chain Link Wire Fence. Stewart Fences assure continuous, dependable protection and exclusion of enemy agents. Next month may be too late—you need Stewart protection NOW! Send for Catalog No. 79. Sales and Erection offices in principal cities.

THE STEWART IRON WORKS CO., INC.
866 Stewart Block Cincinnati, Ohio

"Fence Builders to America Since 1886"

Stewart IRON and WIRE FENCES

Stockholders Approve York Recapitalization

After two adjournments (March 25 and May 20) the stockholders of the York Ice Machinery Corp., at a meeting held on May 28, voted to adopt the agreement of merger with York Corp. The vote for the merger stood at 40,529 preferred shares, or 75.9 per cent, and 121,326 common shares, or 75.1 per cent.

This action by the stockholders does not, however, make the merger fully effective because of the legal proceedings brought by certain objectors in the Federal District Court in Wilmington, Del. The hearing was set for June 13.

Orders booked for the first six months of the current fiscal year, ended March 31, 1941, were 35 per cent in excess of the same period in the previous year. New business subsequent to that date and in prospect continues favorable.

•

RFC-Okonite Lease Made

Defense Plant Corporation, RFC subsidiary, at the request of the War Department, has authorized the execution of a lease agreement with Okonite Co., Passaic, N. J., to provide for the acquisition of machinery and equipment, at a cost of $293,884, to be used in the company's plant at Paterson, N. J.

•

Farms Out Contracts

To speed up national defense production Westinghouse Electric & Manufacturing Co. has "farmed out" $10,000,000 worth of emergency contracts to more than 100 companies, according to Andrew H. Phelps, general manager of purchases and traffic.

LETTER TO THE EDITOR

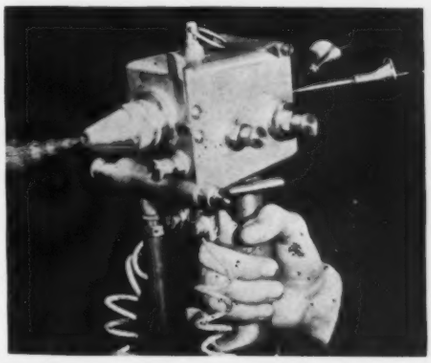
Regulator Settings

To the Editor of Electrical World:

Lest any one use the erroneous value, I wish to correct a mistake when I labeled the vector triangle of the second figure from the top of page 61 in the article "Special Regulator Settings Improve Circuit Voltage" in the ELECTRICAL WORLD of May 3, 1941. The 1-3 voltage (unregulated phase) should, of course be 110 percent and not 115 percent.

H. S. LEWIS, Distribution Engineer
Central Vermont Public Service Corp., Rutland, Vt.

New! SCHOOP
ELECTRO-PISTOL
METAL SPRAYING PROCESS



FOR MANUFACTURING MOLDINGS, MATRICES, DIES, ETC.

Dr. Schoop's revolutionary improvement over all previous metal spraying processes! Utilizing an electric arc, it facilitates operations previously impossible, such as spraying tungsten, molybdenum, chromium, etc. From 2½ to 10 times faster than gas spraying. Reduces costs in making moldings, matrices, dies, etc. as much as 80%! Uses 50v. x 200 amps; capacity 22-25 lbs. steel per hour weight. Approx. 3 lbs.

Typical Electro-Pistol Products

Write (Airmail) or cable for information—TODAY!

M. U. SCHOOP METALLIZING PLANT
ZURICH 5. SWITZERLAND
CABLE ADDRESS, METALLISATOR, ZURICH

Let there be no
Blitz
to Black Out
SAFETY!

In today's production emergency, greater attention than ever before must be paid to SAFETY—or volume and efficiency cannot be brought to peak levels.

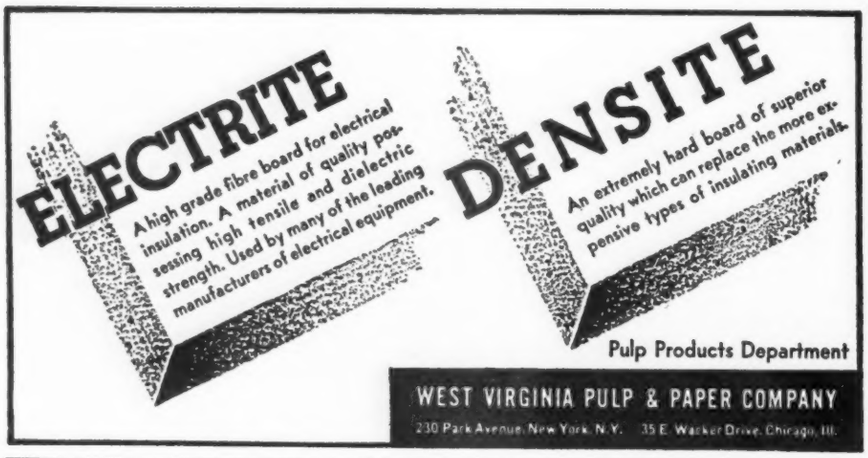
Thousands of partially trained men are now handling jobs that call for the personal skill and care that come only with experience. Many are working long hours and at high speed.

Protect them—and your own operating efficiency—with the proven quality of Miller Anode Electrician's Gloves. The Anode Process results in uniform thickness, strength and safety. Anode gloves withstand repeated electrical tests even after water soaking, setting new standards of safe, certain performance.

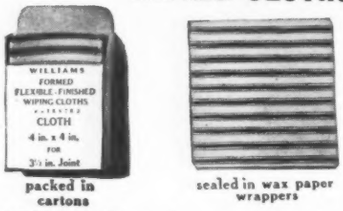
The cost? No more than other gloves of similar specifications. Your Miller jobber stocks a full range of lengths and sizes for Class A and Class B service, in straight-finger or "Curv-Flex" (curved finger) designs. Call him today, or write—

MILLER RUBBER COMPANY, INC. • AKRON, OHIO
"Engineers in Rubber"

Miller
ANODE LATEX **ELECTRICIAN'S GLOVES**


ELECTRITE
A high grade fibre board for electrical insulation. A material of quality possessing high tensile and dielectric strength. Used by many of the leading manufacturers of electrical equipment.
DENSITE
An extremely hard board of superior quality which can replace the more expensive types of insulating materials.
Pulp Products Department
WEST VIRGINIA PULP & PAPER COMPANY
230 Park Avenue, New York, N.Y. 35 E. Wacker Drive, Chicago, Ill.

CABLE-SPLICERS WIPING CLOTHS



packed in cartons — sealed in wax paper wrappers

Wipe Perfect Joints

on lead-sheathed cable splices

A post card for free instructions

GEO. E. WILLIAMS, *Mfr.*

3035 Aldrich Avenue, Minneapolis, Minn.

G.C.A.

Lamp Replacers
Lamp Base Removers
Cartridge Fuse Tongs
Switch Hooks

Send for Catalogue

We have been making safety tools for 24 years

THE G. C. A. Manufacturing Co.

Pittsfield, Mass.

How to wire for light and power

JUST OUT—2nd EDITION OF RICHTER'S

PRACTICAL ELECTRICAL WIRING

500 pages, illustrated, $3.00

IN ACCORDANCE WITH THE 1940 CODE

Here is a complete course of instruction for those who want to learn how to do electrical wiring. Begins with very first elements and takes the reader by easy steps, plain instructions and methods, to the completion of typical wiring jobs in accordance with official requirements of the 1940 National Electrical Code. Employs simple language; confines mathematics and theory to the minimum necessary for understanding of the work; covers medium voltage jobs of the types that are most in demand.

3 parts cover residential, farm and industrial wiring

1. Underwriters and codes; electrical principles and measurements; basic devices and circuits; wire, sizes and selection; connections and joints; residential and farm motors; etc.

2. Planning an installation; specific outlets; switches and other devices; old work; farm wiring; isolated lighting plants; wiring apartment houses, etc.

3. Planning non-residential installations; non-residential lighting; miscellaneous problems; wiring for motors; wiring schools, offices, stores, and churches, etc.

MAIL THIS COUPON FOR 10 DAYS' FREE EXAMINATION

McGraw-Hill Book Co., 330 W. 42nd St., N. Y. C.

Send me Richter's Practical Electrical Wiring for 10 days' examination on approval. In 10 days I will send $3.00, plus few cents postage, or return book postpaid. (Postage paid on orders accompanied by remittance.)

Name .....

Address .....

City and State .....

Position .....

Company ..... W. 6-14-41

(Books sent on approval in U. S. and Canada only.)

More Capacity for Distribution

[*Continued from page 67*]

For reliability, at least two feeders are commonly brought into the area, with manual throw-over arrangements in case one feeder is in trouble. Thus we have available most of the elements for creating a light-duty, low-voltage network with the exception of an economical network protector, and this is now in the hands of our development engineers.

Dual Feeds

The distinction between the single-phase area power supply and the three-phase business section power supply is that the latter requires at least two feeders for reliability. The paralleling of the secondaries of transformers that are tapped off different feeders to form a network presents problems that do not exist in the previous case of banking single-phase transformers where all units are tapped off the same feeder. With two feeders supplying three-phase network transformers, a short circuit on one feeder will open its substation breaker, but this operation alone is not sufficient to remove the fault. The good feeder and its transformers continue to transmit power to the network, resulting in reverse flow through the transformers attached to the feeder in trouble. To clear the fault completely, each of these transformers must be disconnected from the network by action of reverse power devices in associated network protectors. The network protectors that are needed for this purpose are the heart of the three-phase, light-duty network system that is considered desirable for supplying important community centers.

Metropolitan networks are supplied by four to twelve feeders, with transformers from 225 to 750 kva. In these lighter density areas we must change this conception of a network and use only two feeders with 15- to 100-kva. transformers arranged so that if one feeder is out of service the other can carry the whole load over a peak period. The excess transformer capacity to meet these overloads can be kept to a minimum by loading the transformers on a copper temperature basis. This method, together with a simplified form of network equipment, should produce a system comparable in cost with the present radial

system. Such a network can supply both motor load and lighting load from the same secondaries due to the improved regulation over the radial system.

Industrial Trend

Long-term predictions are hazardous, but if one observes the trends of expansion in industry it becomes apparent that the tendency is to discontinue the development of large centrally located manufacturing plants. This is a further indication of the likelihood of expansion of distribition systems for the medium load areas. To obtain efficient and effective operation using modern production methods, the most economical size for a plant seems to range from 1,000 to 5,000 employees. As a part of this trend, we may expect a long-term movement of people from farms to such communities. From common observation, farms are nowadays being more efficiently handled and fewer farmers are needed to produce our food requirements, while at the same time there seems to be an inexhaustible desire for the products of our factories, even on farms. All of this means that the continuing growth of medium-sized communities having from 10,000 to 100,000 population may be expected in locations where good transportation facilities are available.

Ability to build transformers in smaller dimensions arising from the development of new core iron fits in with the desire for underground construction in the new high-class residential areas. One promising scheme now being tested consists of placing a standard transformer with minor modifications in a shell buried in the ground, eliminating any costly vault construction. The air space between the transformer and the shell is the essential element in transferring the heat to the atmosphere. The earth is not relied upon for heat dissipation because as it dries out it becomes a poor conductor of heat.

•

Lets Turbine Contract

Los Angeles Water and Power Bureau, Los Angeles, Calif., has awarded a contract to Westinghouse Electric & Manufacturing Co. at $137,489 for furnishing auxiliary steam turbine-generator unit and accessories, for Los Angeles Harbor power station (Specifications 3688).

Is YOUR Material Drafted?

Why Not Try STAR PORCELAIN?

It has tremendous advantages at a time like this. DIES are less expensive. You can TRY PORCELAIN without a large investment.

There are many various KINDS of porcelain, with differing characteristics.

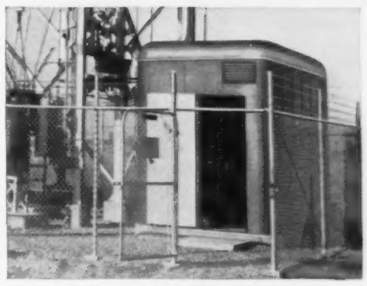
You may find porcelain SUPERIOR to the material you are now using, and thus develop a PERMANENT improvement in your product.

There's NO expense attached to finding out. Just write us—we are the LARGEST MANUFACTURER of special electrical porcelain in the U. S. Send for Technical Bulletin

The STAR PORCELAIN COMPANY

51 Muirhead Ave. **Trenton, N. J.**

BUTLER READY-MADE STEEL BUILDINGS

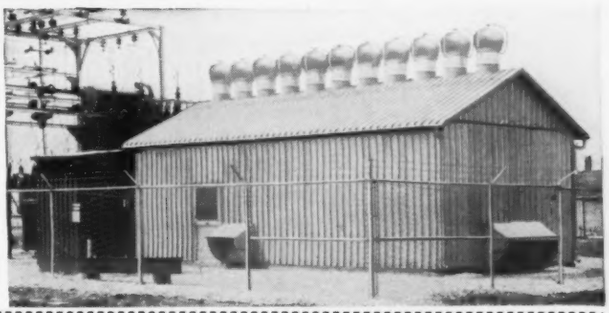


Above—**BUTLER STEEL TRUCK GARAGE**—40' x 74' x 10' equipped with overhead doors. Butler round-roof buildings are available with clear spans of 100', any length—also with monitor roof.

The **BUTLER BOULEVARD BUILDING** above is 8' x 12' x 8'6" and houses **SUB-STATION** control equipment. It has double panel steel walls—Steel inside and outside—with insulation between and available in many strikingly beautiful functional designs.

The **BUTLER ALL-PURPOSE BUILDING** at right is 16' x 34' x 10' and houses **SYNCHRONOUS CONDENSER** high voltage control equipment. Ventilated for 20,000 cu. ft. air displacement per min.

Before you build get full facts on this 25 year old development in factory fabricated steel buildings.



BUTLER MANUFACTURING COMPANY

1270 Eastern Ave., Kansas City, Mo. **970 Sixth Ave., S. E. Minneapolis, Minn.**

Send Steel Building Book and Data on..... Type Building, Size..... ft. x..... ft. x..... ft.

Firm Name.....

Address .....

City ..... State .....

NEVER STAB a POLE in the BACK
• Deep stab holes have shortened the life of many costly poles by providing a place where moisture accumulates and rot starts.
Use the new MULTIPOINT CANT HOOK. Its six ¼" points hold more securely than a single long point—yet leave no deep, dangerous holes—in fact, they do not penetrate through the creosote treatment. Here is an easy and inexpensive way to eliminate injurious holes. Further, the new Multipoint Cant Hook gives greatly increased efficiency in pole handling—it grips more securely—spreads the strain over larger area—and more than that, it's self-releasing.
Safer and more efficient to use—will not injure costly poles. Made by The American Fork & Hoe Co., Cleveland, O.
STURDETOOLS
a TRUE TEMPER PRODUCT
STURDETOOLS
MULTIPOINT CANT HOOK
6 points ¼"x½" in size grip the pole securely but leave no deep hole to encourage rot and decay.
Furnished in small, medium and large sizes for handling poles up to 22" in diameter. Prices and complete description on request.
Distributed by
JOSLYN MFG. AND SUPPLY CO.
Executive Offices
20 North Wacker Drive • Chicago, Illinois
Branches and Warehouses with Complete Stocks in Principal Cities of the United States

United Effort Is Necessary

[*Continued from page 66*]

people) for 43 hours a week. This means 123,000,000,000 man-hours, compared with about 94,000,000,000 for 1940.

Let us analyze what possibilities a $110,000,000,000 output, produced by 57,000,000 people working 43 hours a week, would present to the electrical industry, the partnership of power producers and electrical manufacturers. Ten billions of dollars worth of products will be produced to raise 18,000,000 families to the $1,500 level. Many of these families will then, for the first time, be in the market for electric appliances and other types of durable consumer goods. In fact, sales of such products to these and other families may be $5,000,000,000, or 50 percent greater than in 1940. The $10,000,000,000 will provide new and better homes—more homes to be wired for electric ranges and air conditioning. All of these things will cause a large increase in the domestic load. Of course the industrial load for peacetime production must increase also. Some one must make these extra refrigerators, washing machines and automobiles. These people must be transferred from the ranks of the munitions makers. The building material processors and makers of appliances will use some of the power released by the munitions makers.

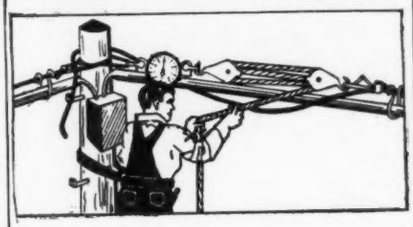
Let us make a plan showing how we think the transition from a wartime to a peacetime economy should be made. The plan should contemplate progressively higher standards of living brought about by greater power consumption. If it is a good plan, we should be able to sell it, but we will have to start soon if we expect to have our plan ready in time.

•

Installs Transformers

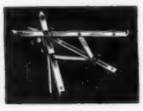
Wisconsin Michigan Power Co. is installing three new 667-kva. transformers at its New London, Wis., substation, doubling the capacity of the station. They will replace three 200-kva. transformers and three 150-kva. units. The substation has been operating the last year at a 60 percent overload, it was said.

DILLON TRACTION DYNAMOMETER



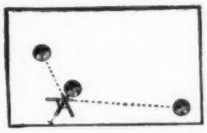
Accurately indicates correct tension applied to cable, guy and messenger wire. Light—rugged.

10 different capacities ranging from
0-500 lbs.....$50.00
0-15,000 lbs.....$117.50
Including Carrying Case & Shackles



DILLON BISECTOR
A new and useful tool for rapid location of correct anchor position. Light weight, sturdy, *simple.*

Quickly bisects exact angle at which anchor should be located to hold with 100% efficiency. May be used by any member of construction crew without supervision. No figuring, no measuring, no tape. Saves time—money.



$4.00 F.O.B. CHICAGO

W. C. DILLON & CO., INC. 5410 W. Harrison Chicago, Illinois

BURNDY
QIK-CONNECTORS

BURNDY ENGINEERING CO., INC., 459 E. 133 ST., N.Y.C.

No Relaxation of Sales Effort

[*Continued from page 75*]

closed much pertinent information about how others see us. We know that many customers feel that electric rates are high without having any sound basis of fact for this opinion. The surveys show that other customers, just as erroneously, considered electricity relatively high in price and not as reasonable as other commodities based upon what you get for your money. These customers simply reflect a critical attitude toward private electric utilities stimulated by general and ofttimes meaningless publicity given to government project "yardstick" rates.

The prosecution of a sound business-building program concurrent with our National Defense program makes it particularly necessary that we maintain an appraisal of factors influencing market development. One important class of information, aside from appliance usage data, is a record of who or what groups of dealers dominate the sale of various types of appliances. A companion study to this is a record of measured advertising to show for any territory the amount of advertising actually done by dealers on the various kinds of appliances. Information of this type has been used successfully as a basis of formulating utility-dealer co-operative sales programs. I believe this type of information should be compiled and made available to the various groups within our industry so that we can have the most efficient and effective degree of united industry effort in executing our sales task. Not only will this be of material assistance during the period of this national emergency but it should serve as a guide to future market development.

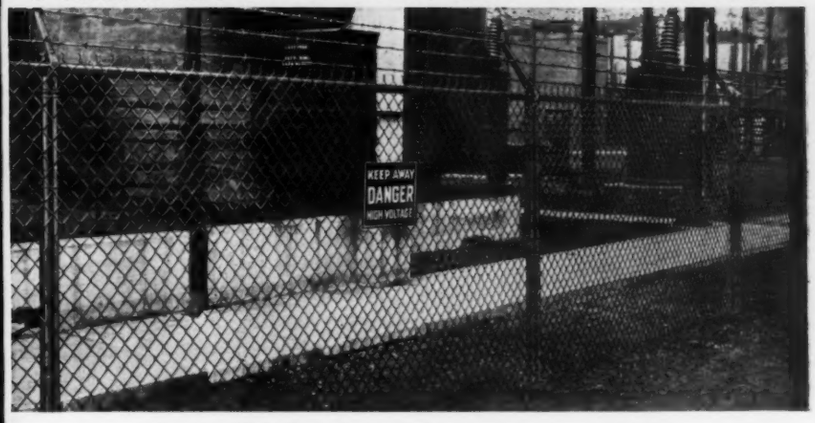
•

Illinois Electric Sales

Total sales of energy to ultimate consumers by the eleven largest electric utilities in the state of Illinois amounted to 719,171,108 kw.-hr. in April, as compared with 643,106,864 kw.-hr. for the same month last year. Although this represents an increase of 11.8 per cent, it must be considered that this percentage gain was affected by the Central Illinois Public Service Co.'s decrease in sales of 7.2 per cent during the same period. This decrease was due to the coal mine strike.

PAGE FENCE

America's First Wire Fence — Since 1883



ITS STRENGTH IS IN ITS SHAPE

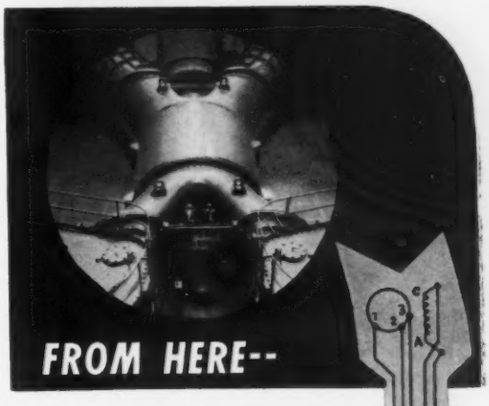
★ Pound for pound, Page Winged Channel Posts—specially developed for use with chain link fence—are strongest and render longest service. Their shape gives them greater resistance to pull and strain, and thus they help to safeguard your investment in property protection. But a better post is but one advantage you get from Page. Only Page provides localized engineering and erecting service. Page Fence is distributed by 102 responsible firms which own and operate their own plants—local business men, technically trained, long experienced and permanently interested in every job they handle. Write for copy of book, "Fence Facts," and name of nearest Page Fence distributor. Address—PAGE FENCE ASSOCIATION, Monessen, Pa., or Bridgeport, Conn., New York, Pittsburgh, Atlanta, Chicago, San Francisco.

A PRODUCT OF PAGE STEEL & WIRE DIVISION—AMERICAN CHAIN & CABLE COMPANY, INC.

Remote readings

by means of

BENDIX AUTOSYNS

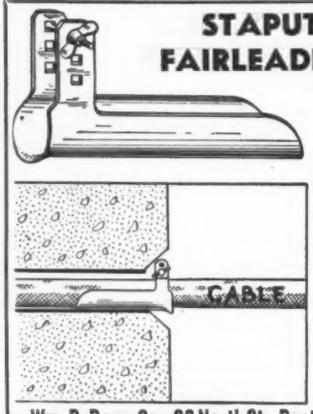


The circuit diagram in the arrow shows how simply a pair of Bendix-Cory Autosyns transmit instrument readings to remote points. Pressure, station load, r.p.m., position, rate-of-flow, count, dimension, liquid level—almost any measure—may thus be read at a distance in one or several places. Several sizes and types. Type 851 (shown) produces 2.5 inch-ounces of torque at 90° angular displacement—safe continuous operating torque 1.1 inch-ounces. Weight 15.3 oz. Dimensions 2¼"x3 15/32". Other Autosyns operate within an accuracy range of 1° + or — (½° + or — on special order).

BENDIX AVIATION CORPORATION

MARINE DIVISION

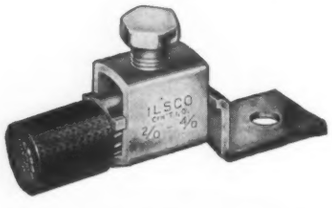
754 Lexington Ave., Brooklyn, N. Y.



STAPUT FAIRLEADERS
(Patented)
Save Your Cables
Prevent Abrasion at the Duct Mouth
•
Low Cost Installation
Wm. B. Berry Co., 88 North St., Boston, Mass.

HIGH GRADE
HARD PORCELAIN
FOR
Electrical Specialties
High and Low Voltages
IMPERIAL
PORCELAIN WORKS
TRENTON, NEW JERSEY

ILSCO
SOLDERLESS CONNECTORS
HAVE YOU TRIED
The New Ilsco Lugs?



BUILT FOR OVERLOADS!
The new design—as passed by the Underwriters' Laboratories May 1, 1940.

MAIL COUPON TODAY
GENTLEMEN:
SEND ME new Catalog & Sample!
Name .....
Firm .....
Address .....
City & State.....

ILSCO COPPER TUBE AND PRODUCTS, INC.
5629 MADISON ROAD — — — CIN., O.

A Design for Living

[*Continued from page 77*]

consisted of 2.9 (practically three) members. The cost of heating in northern New Jersey was less than $50 for the season. This was done with improved oil-burner equipment. It is entirely feasible that comparable costs can be equaled with gas-heating equipment now available. This, for combination gas and electric companies, is another market for expansion.

Plastic Surface Wiring

Copper tubes are rigidly supported in a plastic housing. It is a "unit" system, wherein the sections fit together like sections of a child's toy train track.

A more generous size of copper conductor, elimination of rubber or other insulating coverings, mounting of rigid tubes or rods of copper in strong phenolic plastic housings, provision of a style suitable for surface mounting and generous outlets are the basic changes in the new wiring system soon to be produced by Pierce Laboratory, Inc., a separate corporation organized to work with all parts of the electrical industry that are vitally interested in advancing standards of living through more effective and convenient use of electricity.

Tests indicate that conservative continuous loading up to 35 amp. without undue heating is possible. Extreme loadings of 65 amp. (final branch circuits) will introduce no hazards whatsoever—this as compared to limit of 15 amp. with methods and materials now available.

As to total costs: The three-bedroom house complete with built-in furniture, screens, storm sash, heating plant, electric range, refrigerator and water heater totals $2,079.00. Garage and breezeway can be provided for an additional $300. The same size house with a two-bedroom floor plan is approximately $200 less. To this must be added only the land, say $350, and the builder's overhead and profit.

Thus, for $3,000 to $3,500 a low-cost electrified home can be made available to the low income family. Proper exploitations and good merchandising may ultimately effect costs closer to $2,500 total.

Total weight of this house is 15,800 lb. A ten-ton truck can haul it, in the unassembled form, to the erection site. Just recently one of these homes was trucked from Bound Brook, N. J., to Syracuse, N. Y. (250 miles) over Sunday night. Erection started on Monday morning, and on the tenth day following it was complete, painted and ready for occupancy.

Electrical Equipment

Since the house's heating system does not generate hot water, a 10-gal. electrical unit is provided for that purpose under the kitchen counter and directly behind the water closet, where it is handily connected to the plumbing system.

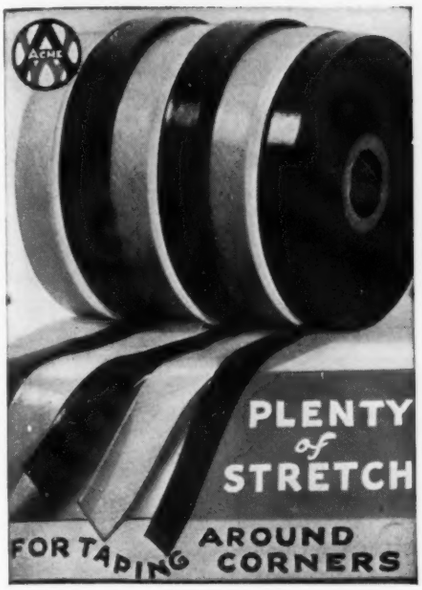
In addition to a small range, the all-electric kitchen includes a refrigerator which makes no ice cubes and has a lid instead of a door.

Promotion Sells Service Values

[*Continued from page 78*]

planned kitchen with new styling throughout and with all electric equipment installed. In connection with this national program "modernizing" and "electrifying" have become synonymous. Here is a sustained, co-ordinated promotional activity, built up on educational and social principles. Four sections of the National Electrical Manufacturers Association have tied in their own product promotion with the over-all educational features in order to mobilize public thinking in terms of making the kitchen workshop a place for efficient, labor-saving and comfortable working conditions. People are being influenced to want modern kitchens, and with sustained promotion kitchen styling with electric equipment will continue to grow and become established construction practice.

Commercial Electric Cooking Council—The program of the council, established with Edison Electric Institute as a sponsor, in conjunction with equipment manufacturers, which incidentally is a prime essential in all our activities, is but a start toward broader achievement. This market among food-dispensing establishments is as large as the American appetite. Owners and operators may have clean, portable and adaptable cooking service with quality cooking resulting from absolute temperature control. Special sales



ACME BIAS TAPES

are made of high grade cotton fabric treated with special varnishes from Acme's own varnish plant. They have great tensile strength and flexibility and may be stretched snugly into all corners and crevices, making a mechanically smooth and electrically efficient seal. Offered in bias or straight tapes or rolls up to 36" wide, yellow or black. Samples if requested. Address *The Acme Wire Co., New Haven, Conn.*

Acme Wire Products

VARNISHED INSULATIONS — MAGNET WIRE COILS

"ANVIL" BRAND BLOCKS

Linesmen find "Perfect" Metal Block gives best service.

Send for Catalog E.W. covering full line

Western Block Co.
Lockport, N. Y.
NEW YORK CITY
74 Murray St.
CHICAGO
34 N. Clinton St.

THE ELECTRICAL BUYERS REFERENCE is packed full of buying and specifying information, all in one handy, ever-ready volume.

Active electrical men say it's the most valuable volume in their offices. Use it yourself . . . it's *your first source of information.*

• ELECTRICAL • BUYERS REFERENCE

330 West 42nd Street, N. Y. City

appeal in this counter-type equipment is the ability of diners to watch the cooking process. When one realizes that an average of 50 percent of the gross profit of drug store operation comes from the luncheonette, it is not difficult to sense the potentialities of the market for equipment in the thousands of other restaurants. Utility gain in this field is indicated by test and survey which show an approximate annual energy use of 1,500 kw.-hr. per kilowatt of connected load on such equipment.

Electric Water Systems Council—Our rural neighbors have not been forgotten in sales intensification. The disadvantages in living conditions for homes not having running water are too many to enlarge upon here. Appreciation of them led to formation of the Electric Water Systems Council, which is composed of representatives of Edison Electric Institute working co-operatively with the pump manufacturers, and it is in its eighth year of progressive development. This council actively carries through local utilities, dealers, the plumbing trade, local farm organizations and numerous other groups a message of service values through use of an electric water system.

The internal economic health of the electric utilities demands that the electrical industry does not falter in telling the civilian population, though national co-ordinated promotion, the benefits of electrical equipment and its utilization, whether in home, commerce or industry. Through association leadership, national promotion in education, social and economic enlightenment of the public is not only advisable and productive of common good, but in effect it is a vital element in our American democratic life.

•

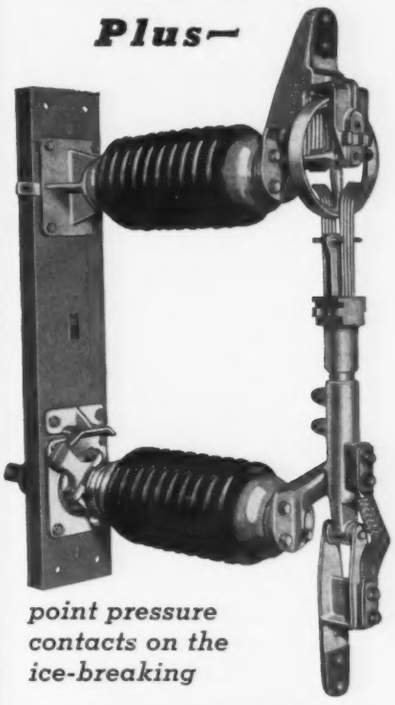
Plans Plant Expansion

Chicago Transformer Corp. has approved plans for new addition to plant, to be one-story, 120 x 234 ft., for expansion in production department. Also for improvements in present works. Erection contract has been awarded to J. Emil Anderson & Son, 3659 West Belle Plaine Avenue, Chicago, and work will proceed at once. Engineering Systems, Inc., 221 North LaSalle Street, is architect and engineer.

Introducing—

WHEEL ACTION

Plus—



point pressure contacts on the ice-breaking

KEARNEY
Horizontal Break
GANG SWITCH

NOW — wheel-action plus multi-point pressure contacts provides excellent ice-breaking ability and efficient current transfer on modern Kearney Rotating Insulator (Horizontal-Break) Gang Switches.

Surprisingly enough, these sturdy, well-built switches are not high priced, either.

Available in ratings of 7.5 K.V., through 34.5 K.V., 400, 600 and 1200 amperes; and 46 K.V. through 115 K.V., 600 and 1200 amperes, Kearney Single Break Gang Switches are particularly adaptable to line and bus jacks.

Here are switches that have all current carrying parts of high copper alloy with ample cross sectional areas to carry rated loads within accepted 30° C. rise.

For current prices and detail information, ask your Kearney Representative—or write . . . **James R. Kearney Corporation, 4236 Clayton Avenue, St. Louis, Mo. Canadian Plant, Toronto, Canada.**

The Mark of Quality Products

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. TORONTO, CANADA

UTILITY EQUIPMENT

for BETTER Construction

PROFESSIONAL SERVICES

Consulting
Accounting
Valuations

Management
Appraisals
Construction

Designing
Testing
Financing

Inspections
Cost Analysis
Investigations

N. W. ATTERBURY & CO.

Consulting Engineers

General Engineering Service

P. O. Box 1793 Pittsburgh, Pa.

E. T. L.

TESTS

Electrical, Chemical, Mechanical, Photometric

INSPECTIONS
Materials and Supplies

RESEARCH
Private Labs. for Clients

Electrical Testing Laboratories, New York, N. Y.

Recording & Statistical Corp.

BILL ANALYSIS—CONSUMPTION STUDIES

THE ONE-STEP METHOD
Bill Frequency Analyzer

102 Maiden Lane New York

BARKER & WHEELER

Utility and Industrial Valuations, Design and Construction of Power Systems, Water Supplies, Sewerage and Sewage Disposal, Factory Production and Cost Control Systems.

11 Park Place, New York City
36 State Street, Albany, N. Y.

FORD, BACON & DAVIS, Inc.

Engineers

DESIGN • CONSTRUCTION
VALUATIONS • REPORTS

New York
Philadelphia — Washington — Cleveland — Chicago

SANDERSON & PORTER

ENGINEERS
for the
FINANCING—REORGANIZATION—
DESIGN—CONSTRUCTION—
of
INDUSTRIAL and PUBLIC UTILITIES

Chicago New York San Francisco

BLACK & VEATCH

Consulting Engineers

Water, Steam and Electric Power Investigations, Design, Supervision of Construction, Valuation, Tests and Laboratory Service.

4706 Broadway, Kansas City, Mo.

FRANK F. FOWLE & CO.

Electrical and Mechanical
ENGINEERS

35 East Wacker Drive Chicago, Ill.

SARGENT & LUNDY

ENGINEERS

140 South Dearborn St.

Chicago, Ill.

E. J. CHENEY AND CO.

Engineers and Consultants

61 Broadway New York

HOOSIER ENGINEERING COMPANY

Erecting Engineers
Transmission Lines, Substations

46 So. 5th St., Columbus, Ohio
327 South LaSalle Street, Chicago, Ill.
136 Liberty St., New York

SPOONER & MERRILL, INC.

Consulting Engineers

Design—Supervision of Construction
Reports—Examinations—Valuations

20 North Wacker Drive, Chicago, Illinois

HUGH L. COOPER & CO.

General Hydraulic Engineering, including the design, financing, construction and management of hydro-electric power plants.

101 Park Ave. New York

WILLIAM S. LEFFLER

succeeding
CHARLES F. LACOMBE—WILLIAM S. LEFFLER
Engineers — Economists
Public Utility Management Problems
Economic Audits for Selective Load Building
Balanced Domestic Load Development
Cost Analysis—Rate Cases

30 East 42nd Street—New York

STEVENS & WOOD

Incorporated
ENGINEERS AND CONSTRUCTORS

30 Broad Street New York

DAY & ZIMMERMANN, INC.

ENGINEERS

Design - Construction - Management
Investigations and Reports

NEW YORK PHILADELPHIA Packard Building CHICAGO

CHAS. T. MAIN, INC.

Engineers

Boston, Mass.

Electric, Steam and Hydraulic Projects. Investigations, Reports, Designs and Appraisals.

STONE & WEBSTER ENGINEERING CORPORATION

Design and Construction
Reports • Examinations • Appraisals
Consulting Engineering

BOSTON • NEW YORK • CHICAGO
PITTSBURGH • SAN FRANCISCO • LOS ANGELES

H. F. FERGUSON

Consulting Electrical Engineer

Rate Investigations and Comparisons
Plant Surveys—Reports

288 Alameda Avenue Youngstown, Ohio

DANIEL W. MEAD
F. W. SCHEIDENHELM

Consulting Engineers

Hydro-Electric Development, Dams, Water Supply, Flood Control. Engineering Problems relating to Water Rights and Water Power Law. Appraisals.

New York City, 50 Church St.

A. Y. TAYLOR AND COMPANY

Municipal and Industrial Consulting Engineers

Reports, Appraisals, Design
Supervision of Construction

2 So. Central Ave. Clayton, Mo.

ROBERT E. FOLEY CONSTRUCTION CORPORATION

Rural Lines—Transmission Lines
Fire Alarms—Telephone Lines

48 Griswold St. Binghamton, N. Y.

ARTHUR L. MULLERGREN

Public Utilities Consultant

Management

Fairfax Bldg. Kansas City, Mo.

THE J. G. WHITE ENGINEERING CORPORATION

Engineers — Constructors

New York, N. Y.

Instrumentation Gives Gain in Hydro Output

[*Continued from page 83*]

ance with the prevailing head conditions on the plant and in line with the ideal loading schedule, Fig. 4, the beginning and end of each operating period within a given range corresponding to any number of units was readily determinable from the chart, Fig. 7. The comparison between the limiting discharges for the number of units as determined from the operator's log provided the basis for the evaluation of the duration of inefficient operation.

Load Limit Indication

A unit discharge scale was added to the total station discharge indicator. From it the operators can tell when the loading on the station reaches a point warranting a change in number of units. An automatic alarm gives the operators a warning when a limiting value has been reached. One warning light is on the operator's desk and the other on the instrument board above the station total discharge recorder. For each load range between two station discharge limits there is available one contact-making cam assembly independently adjustable as to the part of the total discharge range it will control. A control switch was also provided with one position for each discharge range, that is, number of units to be operated, connected so as to keep the lights extinguished when set for the number of units to be in operation for best efficiency as long as the discharge is within the corresponding range. As soon as the discharge crosses the lower or upper limit of this range the warning lamps are lit from the contact assembly of the adjacent range and remain lit until either the switch has been reset to the number of units corresponding to this new discharge range or the discharge returns within the old range through total station load adjustment. Hence, with the control switch set correctly—that is, in accordance with the number of units in operation for best efficiency—the illumination of the warning lights will indicate inefficient operation.

To keep a definite record of inefficient operating intervals the station total discharge recorder was also equipped with an additional pen element operating simultaneously and in parallel with the load limit lights. This provision also enables the operators to ascertain the duration of the period of inefficient operation prior to noticing the warning lamps being lit. As soon as the warning has been noticed the operator notifies the load dispatcher, who, in turn, must take the responsibility in deciding whether or not a unit is to be shut down or placed on the line, whichever the case may be. At the same time this indisputable record of station operation, Fig. 8, is of great value to the efficiency engineer to check on actual operating performance.

Since this apparatus has been placed in service inefficient operation has been reduced to a minimum and it is estimated that the total average yearly gain in output due to all causes already obtained is in excess of 5,000,000 kw.-hr.

•

American Steel Rebuilds Units for Duluth Plant

Two open-hearth furnaces of the American Steel & Wire Co. which have not been in operation for several years are being rebuilt at Duluth, Minn. These two furnaces when placed in operation will increase the annual ingot capacity of the company to the extent of 174,000 tons. The company at present has five furnaces in operation in Duluth and will have seven when the two now being rebuilt are completed. The first furnace is expected to be finished by the latter part of June and the other late in July.

These rebuilt units will be of assistance in meeting the additional steel demands growing out of the National Defense Program.

•

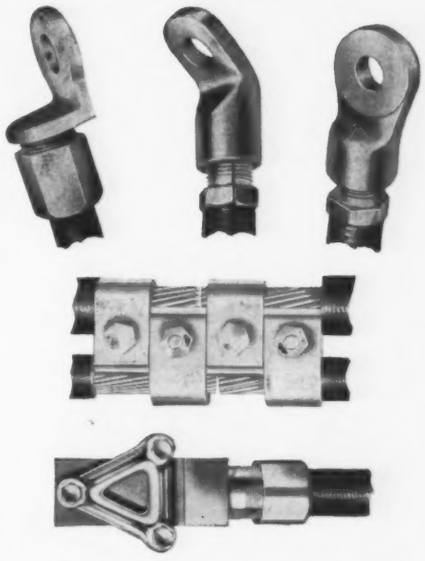
GRDA Awards Contracts

Grand River Dam Authority, Vinita, has awarded a contract to Westinghouse Electric & Manufacturing Co. at $157,293 for transformers and accessories, circuit breakers and auxiliary equipment for installation in new power substation at Tulsa, Okla., to have a rating of 20,000 kv. Also, a contract has been let to Elliott Construction Co., Omaha, Neb., at $269,855, for construction of 110,000-volt transmission line to Tulsa, about 36 miles. New line will lead from hydro-electric generating station on Grand River, near Pensacola, Okla., and will be used for service at new power substation noted.

Here's why

GORILLA GRIPS

are better



Permanent Grip—In every Gorilla Grip Contactor the principles of nut and wedge are used for a maximum compression, dependable locking action in every conductor.

Perfect Contact—Pressure is uniformly distributed over full contact area of the conductor.

Wire Application—There is a Gorilla Grip for every conductor, no matter where it taps or terminates.

Salvage—Can be used over and over again.

Easy Installation—Requires no special tools.

Gorilla Grip Stock Sets.
Assembled to meet your needs.
Write for descriptive book.

National Electric
PRODUCTS CORPORATION
900 Fulton Building Pittsburgh, Pa.

BOOK REVIEWS

An Engineers' Manual of Statistical Methods

By Leslie E. Simon. John Wiley & Sons, Inc., New York, N. Y. 231 pages, illustrated. Price $2.75.

Author is a major at Aberdeen Proving Ground. He talks the engineers' language about sample size and sampling procedure to determine manufacturer's level of quality with mathematical analysis of the practical situation. Consideration given to both inspection on basis of attributes and of variables; gives outline of simple working system of quality control, including instructions to shop foreman. Comments on weaknesses and general adequacy of standards and specifications.

•

Books Received

Experimental Electrical Engineering, Volume II—Fourth Edition. By Vladimir Karapetoff and B. C. Dennison, John Wiley & Sons, Inc., New York. 814 pages, illustrated. Price $7.50.

Electric and Magnetic Fields—Second Revised Edition. By Stephen S. Attwood. John Wiley & Sons, New York, 430 pages, illustrated. Price $4.50.

Practical Electricity for Home Study—Books One, Two, Three and Four. By Frederick C. Raeth. D. Van Nostrand Company, Inc., New York. Book One 180 pages, Book Two 324 pages, Book Three 344 pages, Book Four 319 pages. Prices of set $8.95.

Fourier Series and Boundary Value Problems—By Ruel V. Churchill. McGraw-Hill Book Co., New York City. 206 pages. Price $2.50.

Fluid Mechanics—By Glen N. Cox and F. J. Germano. D. Van Nostrand Co. Inc., New York, N. Y., 274 pages, illustrated. Price $3. Fluid phenomena, measurements, flow in pipes and channels.

Electro-Magnetic Devices. By Herbert C. Roters, John Wiley & Sons, Inc., New York, N. Y. 561 pages, illustrated. Price $6. Magnetic theory, bases for optimum design, design data in formula, tabular and graphical form for wide variety of magnets, solenoids and relays.

Silent Sentinels. Published by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. 186 pages, illustrated. Price $1. A text book on the prevailing relay art, including most recent developments in design and application of high-speed protection. Extensive bibliography and data included.

Practical Electrical Wiring—2d Edition. By H. P. Richter. McGraw-Hill Book Co., New York, N. Y., 521 pages, illustrated. Price $3. Based on 1940 National Electrical Code.

College Physics (Abridged)—By Henry A. Perkins, Sc.D. Prentice-Hall, Inc., N.Y.C., 591 pages, illustrated. Price $3.50.

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT : "OPPORTUNITIES" : EQUIPMENT
BUSINESS : : USED OR RESALE

UNDISPLAYED —RATES— DISPLAYED

10 CENTS A WORD. MINIMUM CHARGE $2.00

Positions Wanted (full or part time salaried employment only), ½ the above rates payable in advance.

Box Numbers—Care of publication New York, Chicago or San Francisco offices count as 10 words.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Individual Spaces with border rules for prominent display of advertisements.

The advertising rate is $6.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

NEW ADVERTISEMENTS received by 10 A. M. Monday will appear in Saturday's issue, subject to limitations of space available.

POSITIONS VACANT

GRADUATE ELECTRICAL ENGINEERS or experienced electrical draftsmen qualified to design electrical stations by Midwest Public Utility Engineering Organization wanted. Application should include outline of training and experience, and indicate salary desired. P-904, Electrical World, 520 N. Michigan Ave., Chicago, Ill.

VALUATION ENGINEERS: Experience essential in hydro-electric, steam-electric, manufactured and natural gas utility inventories and valuations. State experience and salary expected. P-915, Electrical World, 330 W. 42nd St., New York, N. Y.

MANUFACTURER selling nationally will add to their staff an electrical engineer who has had engineering experience as well as business experience. Position is investigating the manufacturing of new products. Kindly give your experience and compensation desired. P-916, Electrical World, 520 N. Michigan Ave., Chicago, Ill.

EXPERIENCED OPERATORS on large high pressure turbines, auxiliaries, powdered fuel boilers wanted. Location approximately 100 miles from Philadelphia, Pa. P-917, Electrical World, 330 W. 42nd St., New York, N. Y.

EMPLOYMENT SERVICE

SALARIED POSITIONS, $2,500 to $25,000. This thoroughly organized advertising service of 31 years' recognized standing and reputation carries on preliminary negotiations for positions of the calibre indicated above, through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by a refund provision as stipulated in our agreement. Identity is covered and, if employed, present position protected. If your salary has been $2,500 or more, send only name and address for details. R. W. Bixby, Inc., 262 Delward Bldg., Buffalo, N. Y.

Executives and Technical Men. Qualified candidate desiring $2,500 to $20,000 position may contact employers through our confidential services, established 26 years. The National Business Bourse, 20 W. Jackson Blvd., Chicago.

POSITIONS WANTED

(See also "Selling Opportunity Wanted")

ELECTRICAL ENGINEER—15 years progressing experience. Watt hour meters relays voltage regulators—automatic equipment, breakers, synchronous condensers, sub-stations; load-voltage problems. Desires connection with utility or manufacturer. PW-903, Electrical World, 520 N. Michigan Ave., Chicago, Ill.

ELECTRICAL ENGINEER, professional license, 20 years experience supervising electrical layouts and designs for industrial power plants and distribution systems, also experienced in steam plant design. Available now, prefer locate vicinity New York City. W. F. Demmerle, 84 Bay Driveway, Manhasset, N. Y.

ACCOUNTANT-EXECUTIVE—Six years college, ten years experience with utility holding and operating companies in auditing, cost, securities, taxes, corporate matters, systems and methods, seeks position as office manager or assistant to major executive. Free to travel. Reply, PW-910, Electrical World, 520 N. Michigan Ave., Chicago, Ill.

WANTED

ANYTHING within reason that is wanted in the field served by Electrical World can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

SELLING OPPORTUNITIES

OFFERED—WANTED

Selling Agencies—Sales Executives
Salesmen—Additional Lines

OPPORTUNITY WANTED

POWER SALES ENGINEER with 19 years experience in the electrification of diversified industries also experienced in industrial heating, commercial and industrial lighting and commercial cooking. Can furnish excellent references as to ability and character. SA-914, Electrical World, 520 N. Michigan Ave., Chicago, Ill.

THESE ADVERTISEMENTS

constitute a comprehensive group of "live" opportunities in the industry served by this paper. . . .

Each announcement represents a current Want of a concern or individual in the industry with some element of profit in each for whoever can fulfill the need. Some have money-saving possibilities, others are opportunities for more business; many are employment opportunities while still others offer chances to buy going businesses, plants, property, etc.

"Searchlight" advertisements are constantly changing. New opportunities find their way into this great Want medium each issue. Regular consultation of the "Searchlight" pages should be as important to the careful reader as reading editorial articles of his particular liking. One is news of the industry, the other, the NEWS OF OPPORTUNITIES being offered in the industry.

For Every Business Want

"Think SEARCHLIGHT First"